THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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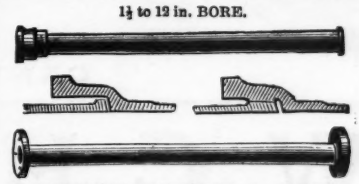

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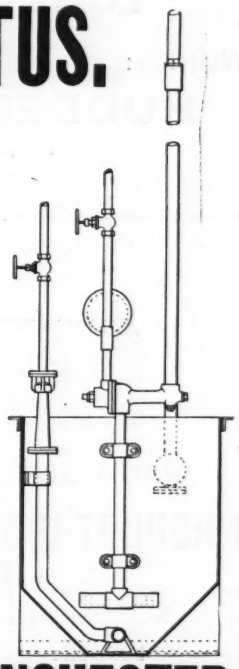

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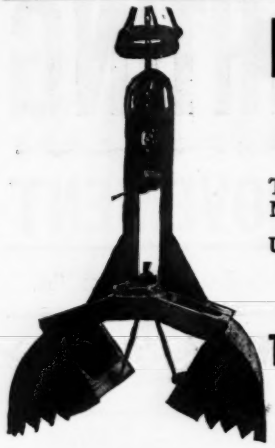

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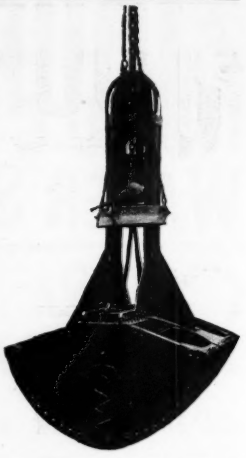

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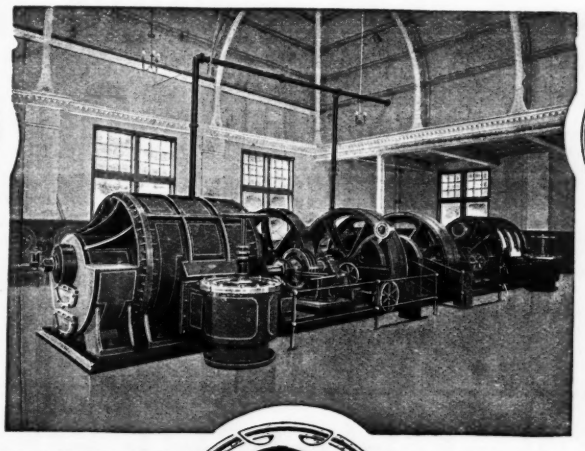

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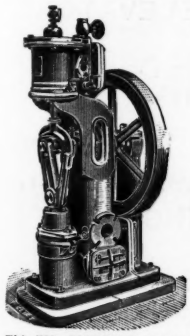

Fig. 705. "SINGLE RAM" STEAM-PUMP.

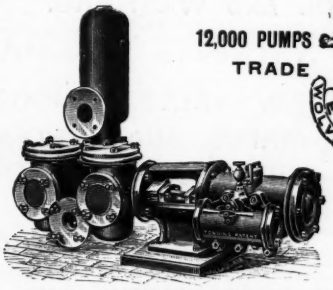

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

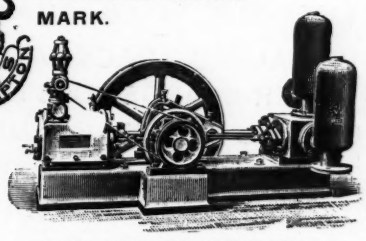

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

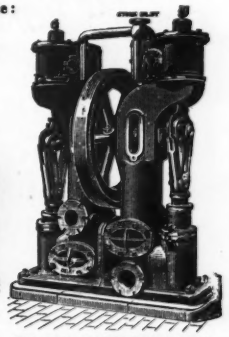

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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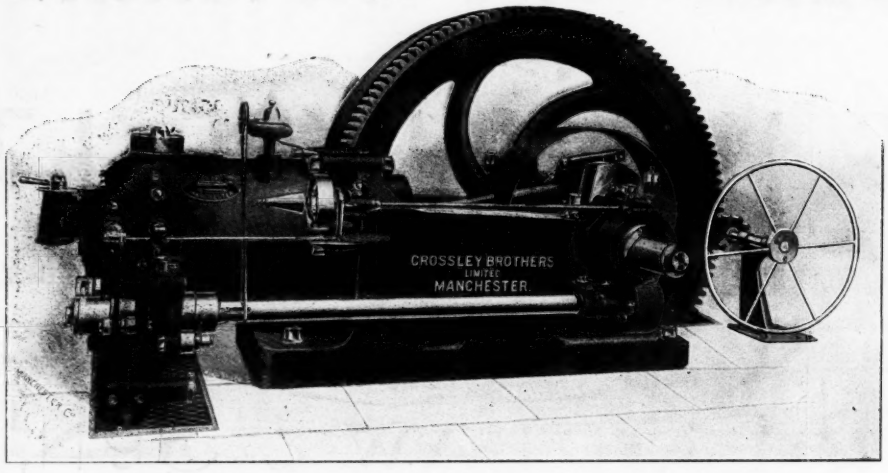

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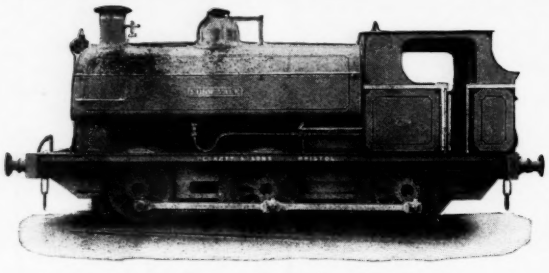

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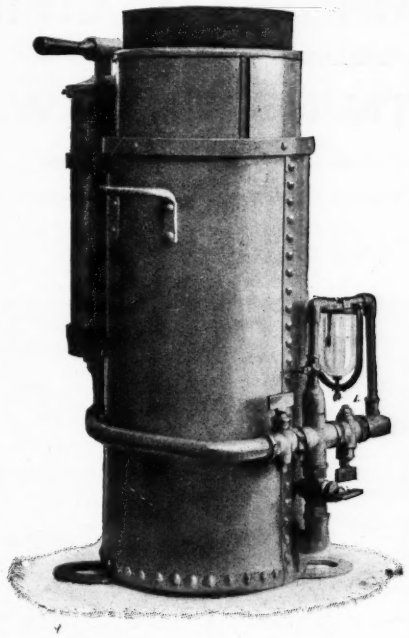

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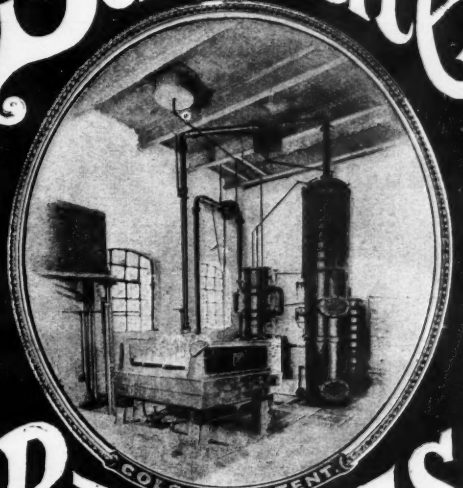

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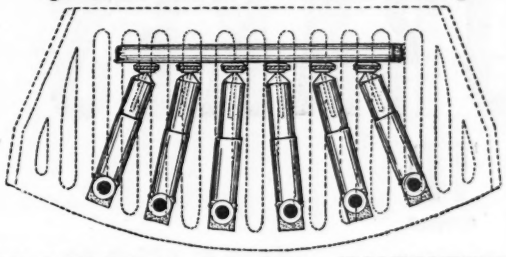

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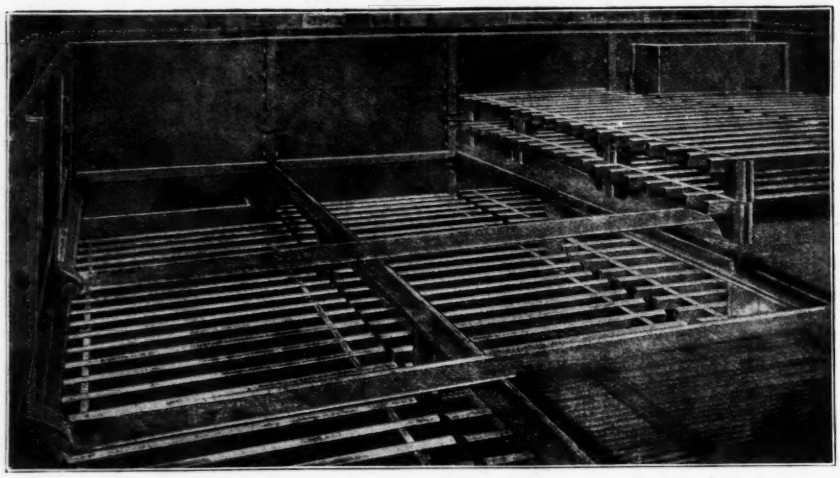

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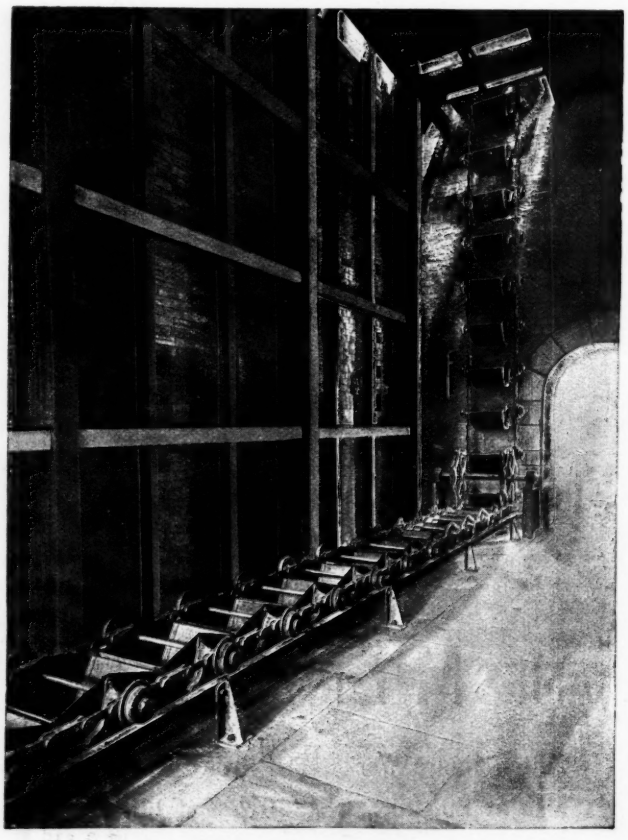

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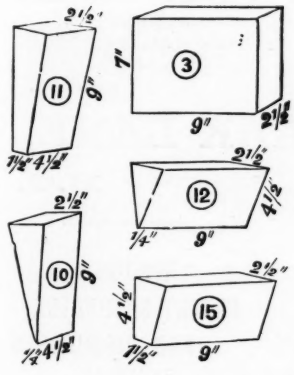

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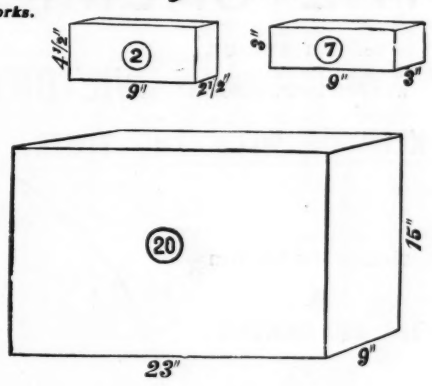

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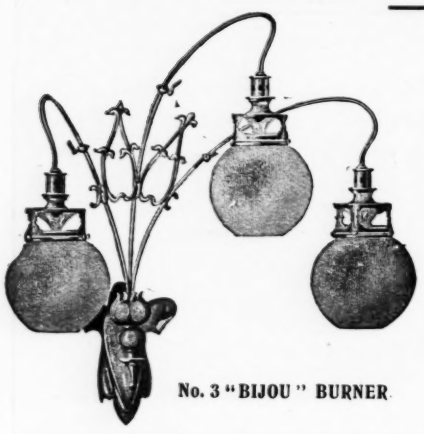

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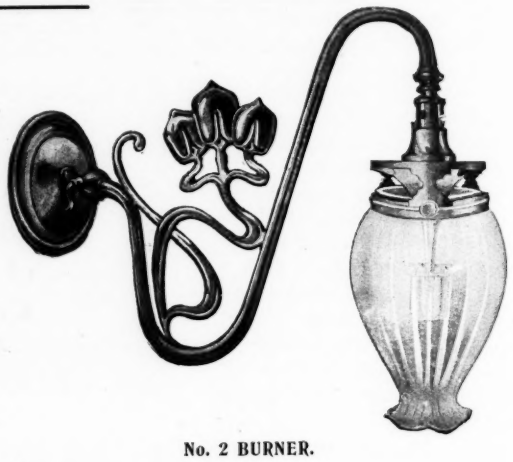

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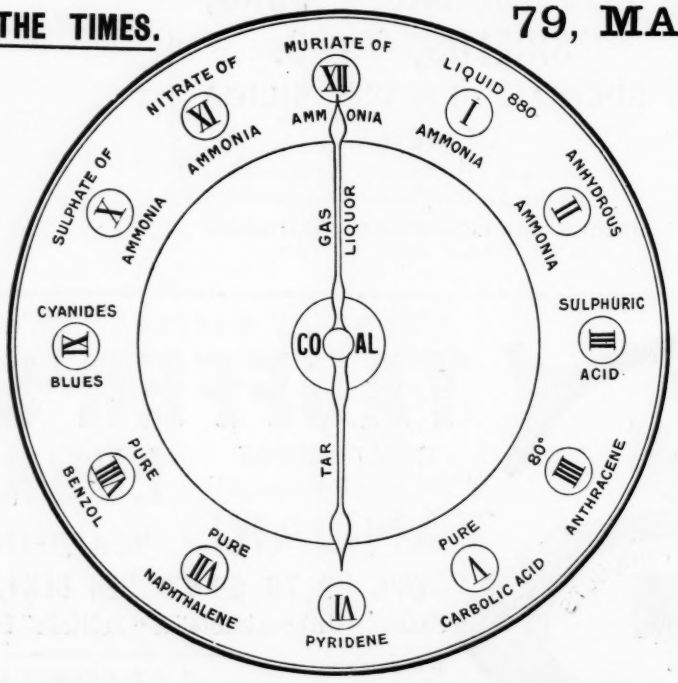

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EDITORIAL NOTES—GAS, &c.

Important Decisions In and Out of Parliament.

FAILURE, expected and indeed as certain as anything could be, has been the result of the hostile action of the Newcastle-upon-Tyne Corporation against the Joint Bill for the removal of the absurd and uncommon restrictions as to sulphur compounds. Mr. Cawley and his colleagues of the House of Commons Committee who were instructed to consider the matter were unanimously of opinion that the evidence that was advanced by the Corporation was in no wise superior to that upon which Lord Rayleigh's Committee came to the conclusion to recommend the abrogation of the restrictions; and the Joint Bill and all the Bills containing relief clauses now proceed through the Commons. It is to be hoped that this check will, after the irritation of defeat has worn off, have a mollifying influence on the Corporation. Rumour has it that some one or other has already said that the Corporation will again essay to overthrow the joint measure in Committee of the House of Lords; but rumour will, we trust, on this occasion be found to be a false prophet.

The South Suburban Gas Company's Bill and the South Metropolitan Bill were linked together for consideration by a Committee last week; but the Committee's services were dispensed with. The South Metropolitan Bill, which was a land measure, has been marked "withdrawn" in the official papers; and we hear it is not improbable that some agreement is likely to be arrived at between the Company and the parties owning the land in question. In the case of the South Suburban Bill, an agreement has been effected with the seven authorities who were prepared to contest it. It will perhaps come as a surprise to the gas industry to learn that the Company have given up what was the cardinal point of their Bill—namely, 13-candle gas. But Sir George Livesey and his colleagues have the strongest possible motives for doing this. The proposal which enabled them to sacrifice the projected 13-candle standard emanated not from their own midst, but from the chief official of one of the opposing Local Authorities. There is satisfaction in saying this, in view of the mistaken and fanatical opposition to the Company in the past. When the particulars of the agreement are ripe for publication, it will be found that the "give and take" that has brought about agreement, will, in the present, be more advantageous to both the consumers and the Company, than would have been the financial loss occasioned by a parliamentary fight. Though there is no particular sense in retaining illuminating power as a standard of quality in these days, fair and reasonable testing methods have somewhat altered the situation. Where those methods are applied, gas authorities can afford to stop, when there is any real opposition, at somewhere about the 14 candles that Parliament has in recent sessions been quite willing to concede, until such advances are made in the system of carbonization or other means of production that gas manufacturers can go to Parliament and show that the application of those advances will be to the benefit of the consumers. In due season, the complete terms of the South Suburban agreement will be made known.

Other matters of importance have occurred during the week in Parliament. The gas industry are the debtors of the Unopposed Bills Committee of the House of Commons, and, we think it may be said, especially of the Chairman of Ways and Means (Mr. Alfred Emmott), and the Speaker's Counsel, Sir Chandos Leigh. Throughout the history of the gas industry, its undertakings have offered a secure and profitable investment for private capital; but of recent years a species of promotions in gas undertakings has sprung up which have threatened to weaken the confidence in gas stocks and shares that the public have now for generations enjoyed. Some of these precious promotions have been launched upon the public by cleverly drawn but specious prospectuses, calculated to appeal to a public confident, through past experience, of the abiding strength of gas investments. Investigation has shown that certain of these concerns have been considerably over-capitalized; and that those who stood the best chance of enrichment were the promoters, through the web spun round the particular undertakings serving as the foundation for public appeal. In the Mid-Oxfordshire example, Messrs. E. O. Preston and Co. are interested in the sale of the undertakings of the Shipton and Charlbury Companies as beneficial owners of all the shares; and they are also holders of the founders' shares in the Finance and Construction Company, Limited, who, in addition to bearing the promotion expenses, undertake certain work of construction and the reduction of leakage in the distributory systems of the various undertakings—receiving for the service no less a lump sum than £17,500, that is £6500 in shares, and the rest in hard cash. The Water and Gas Securities Company have also been energetically participating in furthering this scheme, as letters in our possession show. Messrs. Preston and Co. and the two Finance Companies named all occupy different addresses.

We state these facts for what they are worth, and leave readers to draw their own conclusions. Perhaps the worst that can be said of the Mid-Oxfordshire project is that it is a skilfully-devised money-making scheme built upon the past good reputation of the gas industry. There could not, however, be a stronger condemnation of the concern than that, after the Bill promoted to obtain statutory powers had been twice under the consideration of the Unopposed Bills Committee, that Committee should unanimously express the opinion that the finance of the concern is so unsatisfactory that, on grounds of public policy, statutory powers must be declined. After this declaration, we are not prepared to say what is the position (but we have no doubt they will look into the matter on their own behalf) of those who have subscribed money on the strength of the statement in the prospectus that the Company "are "applying to Parliament for an Act, which has been read "a second time in the House of Commons, and is unopposed "in the House." The Finance and Construction Company are to bear the expenses of this application to Parliament; and they are now under obligation to, should the Company so request, make application for a Bill again next session. Should they do so, there will have to be a considerable reconstruction of the financial part of the scheme to satisfy the authorities. Meantime, the Unopposed Bills Committee have earned the gratitude of the gas industry for doing their part in preserving its good name among investors, and for warning off promoters of schemes, the financial side of which will not bear very close scrutiny.

Another event of the week has been that the Pontefract Corporation have carried through the Police and Sanitary Committee of the House of Commons the clauses in their Omnibus Bill providing for the compulsory purchase of the Gas Company's works. There is not yet a precedent for the compulsory expropriation of a Gas Company that has been contested right through Parliament; and therefore until the House of Lords have made their pronouncement, the word "precedent" is inapplicable to this Pontefract case. The Committee appeared to have been easily satisfied that there had been some want of enterprise on the part of the Company; but, in our opinion, they certainly did not give sufficient consideration to the results of the enterprise of the present. Having regard to the character of the district, the consumers have not, in the matter of price, much of which to complain; and the fact that there is an excess of plant is a guarantee that there will not be for some time to come any necessity for a large expenditure of capital for works to meet the increased consumption that the activity in securing new custom is sure to bring about. This being so, the consumers could, with greater certainty and confidence, in the event of the supply being continued in the hands of the

Company, look for a cheapening of the gas than if the undertaking is transferred to the Corporation, who will have both sinking fund and interest to provide on the purchase-money, and will also doubtless want something from the concern "in aid of the rates."

The provision of an excess of manufacturing plant on a gas-works is not such a grievous mistake as the failure to take precautionary measures for the future and for fortuitous upward fluctuations in the demand. But this excess of plant was the strong point in the case for the Corporation. With all their supposed failings, however, the Corporation still love the works, and are desirous of possession. Never in the history of purchase contests in Parliament has there been a weaker case, with, as Mr. Corbet Woodall very correctly described them, more frivolous objections, than in this. Never, too, have Corporation representatives made out a better case before a Committee than in this instance for the retention of the supply in the hands of a Company. Mr. E. H. Stevenson made much of this being a maximum dividend company, and the consumers therefore not receiving the advantages of the sliding-scale. By transference to the Corporation, the consumers will have that advantage for ever closed against them. It was argued by Mr. Wedderburn, too, that the shareholders' security might be lessened in the future by the electric light. The argument applies equally to the Corporation. If there is any weight in it, then better for the risk to be privately borne than be placed upon the ratepayers generally. Albeit, it is said that this is an opportune time for the Corporation to buy; if so, then it is, *a fortiori*, an inopportune time for the Company to sell. Recent energy has shown—and the Corporation are not oblivious to this—that the prospects for both consumers and Company have improved. A change to municipal ownership, so far as the consumers are concerned, would indubitably cause a set-back in their prospects. The particularly soft impeachments which had such influence on the Police and Sanitary Committee of the Commons may not so unduly impress a Committee of the House of Lords.

The Budget—Remission of the Coal Tax.

The Chancellor of the Exchequer is privileged to dip his hand into every man's purse; and his annual statements are consequently invested with peculiar interest. On the present occasion, this interest was accentuated by the recent change of Government; and expectation was rife as to the extent to which this might manifest itself in the Budget proposals. At the same time, it was clear that with only a modest surplus to dispose of, and but little time for the consideration of the various problems involved in the national finance, not much of novelty or relief to the taxpayer was to be expected from Mr. Asquith's first financial statement. No disappointment could therefore be felt at what has been denounced as its "humdrum" character; and doubtless those who crowded the House and its precincts to hear it delivered felt themselves sufficiently repaid by its singular lucidity, and the thorough mastery of intricate figures displayed by the Chancellor of the Exchequer.

This, however, does scant justice to what in reality was the ushering-in of a new financial era. It is not only what the Budget does, but what the Budget speech foreshadows, which marks a change—momentous, and destined probably to be far-reaching. The promised appointment of a Select Committee, which is already an accomplished fact, to consider the question of graduating the income-tax, indicates what is likely to be the trend of future legislation in this regard; and it shows also the change of opinion which has taken place with respect to it since the days when Mr. Gladstone set his face steadfastly against such graduation. Yet in principle this is already conceded in the graduated exemptions granted to small incomes; and there seems to be no reason why this should not be carried to its logical conclusion. These existing exemptions are a practical admission of what is undoubtedly the case—that the ability to bear the burden of taxation increases in greater proportion than the increase of income. Another phase of the question to be considered by the Committee is, it is understood, the claim of precarious incomes to relief. It is clear that these are on a different footing from incomes derived from property, and they are entitled to relief accordingly, if relief in any shape or form be at all practicable. The conclusions arrived at by the Committee upon these and other points submitted to them should prove interesting reading; and they will in all probability form the basis of legislation on the subject. This, however, affects the future.

As regards the present, it is to be noted that the Government have lost no time in dealing with the coal tax, which is to cease from and after the 1st of November next. This will be welcomed by all English Gas Companies having works abroad, and it will better enable coalowners in this country to meet foreign competition. But the remission will not be of any great—if any—assistance to the Gas Companies in their present accounts; seeing that, as Mr. J. Horsley Palmer pointed out at the meeting of the Imperial Continental Gas Association last Tuesday, by November all the coals required this year will have been shipped. However, a tax like this, upon output and export, can only be defended by absolute necessity, either for temporary revenue purposes or for the husbanding of the national resources. With respect to the latter, the Royal Commission on Coal Supplies completely disposed in their report of any apprehensions that may have existed as to any speedy exhaustion of the coalfields of the country; while the necessity for the tax as an addition to the revenue has now happily passed away. There are good grounds for believing that the late Government did not look upon it as a permanent source of revenue; in fact, Mr. Joseph Chamberlain, in the course of the debate on the Budget proposals, claimed for the late Chancellor of the Exchequer, who was unfortunately absent through illness, that he had expressed the opinion that "the coal duty was "one of the first imposts which ought to go in any redistri-"bution of taxation." This being the case, and both parties being practically agreed as to its despatch, nothing remains but to give it decent burial.

Depreciation and the Income-Tax.

At various times attention has been directed in these columns to the importance of systematically writing off for depreciation of gas plant and buildings. Formerly, an idea was prevalent that this was inadmissible, for the reason that no special provision is made for it in the form of accounts prescribed by the Gas-Works Clauses Act of 1871, which only provides, it was argued, for the depreciation of works on leasehold land. This is literally correct; indeed, it might almost be held, but for its innate absurdity, that renewals of works and plant (except renewal of retorts) must not be provided for out of revenue. Such a view would find support, not only from the form prescribed for the revenue account, but from that also for the capital account, which provides for the charging of all new buildings, manufacturing plant, &c., to capital without reservation as to renewals; the latter being expressly excluded in the case of mains, services, and meters. What may have been in the minds of the framers of this form of accounts—whether it was supposed that gas-works, unlike services and meters, are imperishable—need not now be inquired. Renewals have long been regarded as an obligation devolving upon revenue; and it is probable that only in the case of entirely new works, to take the place of old ones, has the principle of charging all renewals to revenue been departed from. Even in such a case, it is generally admitted, whether or not it is actually done, that the capital account should be relieved at the expense of revenue of the value of works abandoned. A high capital account is inimical to the supply of cheap gas; and therefore every effort should be made to avoid it. As to this, all are agreed; but all have not the courage of their convictions, more especially when, as is sometimes the case, a question of dividend is involved. With local authorities, however, the consideration of profit is an impersonal one; and—perhaps as a consequence—in their case capital is usually kept under to a greater extent than is possible with companies. It behoves the latter to take a leaf out of their book, and in prosperous times write off depreciation with a liberal hand, so as to strengthen their undertakings against a period of increased stress and competition.

In this connection they may be reminded of that which has of late years become increasingly apparent—namely, that gas undertakings, like all other manufacturing undertakings, are entitled (when assessed for payment of income-tax) to an allowance for this item of depreciation; it being provided by the Inland Revenue Act, 1878, that "the In-"come-Tax Commissioners shall, in assessing the profits or "gains under Schedule D, allow such deductions as they may "think just and reasonable as representing the diminished "value, by reason of wear and tear during the year, of any

"machinery or plant used for the purposes of the concern." This provision has become of increased importance and great value to gas undertakings, owing to the extent to which machinery is now applied in gas manufacture; and but little difficulty need be apprehended as to its recognition by the authorities concerned. A serviceable guide for intending applicants for this deduction was furnished by the paper read by Mr. Yuill before the North British Association of Gas Managers last July, and published in the "JOURNAL" at the time. The author gives a classification of deductions as agreed upon by the Inland Revenue Department which appears to be very well adapted for general application, or wherever the capital account is capable of similar dissection. When it is not, it should be possible to agree upon a lump sum, as has been done by the Colonial Gas Association, and more recently by the Ascot District Gas Company. These two cases have to a great extent cleared the way. They have, at all events, indicated one direction in which partial relief from the heavy burden of taxation can be obtained; and it may be expected that the example thus set will be extensively followed.

Testing Incandescent Mantles.

THE course of parliamentary procedure does not permit of an individual's inclinations or engagements being consulted. If it did, there is not the slightest doubt that Mr. Alderman Thomas Canning, J.P., would have been at Newport last Wednesday to receive, in his capacity of President, the members of the Wales and Monmouthshire District Institution of Gas Engineers and Managers. In his absence, Mr. Edward Jones, who has gone from Pontypridd to Burslem, presided over the proceedings. The new Institution made an excellent start at their inaugural meeting last September; and we hope that every member has determined to do his share in aiding the prime-movers in ensuring the technical usefulness of the organization. The members have hardly yet felt their feet; and there is a newness about this meeting together and public discussion which has evidently to wear off before there is a general settling down to contribution to the work in one shape or another. The willing horses, however, must not in the future be worked to death because the others lag behind. The Institution was inaugurated by a brilliant and suggestive address from the President, point after point in which would serve as texts upon which members could enlarge in the form of papers. At Wednesday's meeting, however, the President was up again with a paper on the "Durability and Illuminating Value "of the Incandescent Mantle," and the Hon. Secretary (Mr. Octavius Thomas), who is earnest for success, gave "A Few "Notes on Gas-Mains." This dependence upon the President and the Hon. Secretary from one point of view is not right, though from another the type of papers which they composed for the meeting will serve as exemplars to those members who are not so fully conversant with Association requirements as are Mr. Canning and Mr. Thomas.

The papers were brief, but interest ran through them. In that by the President, he advocates a closer investigation by gas engineers and managers into the lasting and illuminating qualities of incandescent mantles, with the object of protecting gas consumers. It is to be feared that there is a good deal of perfunctoriness in this matter; and that consumers are left too much without guidance. If the mantles on the market were the subject of the constant attention of gas engineers, followed by advice to the consumers, the vendors of mantles would soon see the wisdom of only stocking those classes that met with the approval of the gas authorities. It would not be a bad thing, too, where constant tests are being made of mantles at a gas-works, to go farther, and send round to shopkeepers dealing in mantles a list of the "brands" that the tests disclose are the most satisfactory. In such a case, in order that injustice should not be done, it would be necessary that tests of mantles should be made periodically. All makers of incandescent mantles are not rogues; but those who are not can produce evidence of many who are. And therefore a periodical testing would be requisite. Then, again, it would not be wise that the tests should be made only with mantles delivered direct to the gas offices; mantles purchased from the local retailers should also be brought to the works' test-burners. This precaution would be necessary because the mantle market has lent itself all too extensively to the machinations of tricksters, as certain of the leading makers have found to their cost. It is only by continued scrutiny that deception will eventually be brought to book, and indigent mantles cease to exist.

The tests of ten mantles referred to in Mr. Canning's paper (which was read in his absence by his son, Mr. J. H. Canning) are suggestive of many things, both in the manner of conducting the tests, and in the results obtained. In the first place, we think that durability tests by the continuous exposure of mantles to the heat of combustion of powerful bunsen burners can be disregarded altogether. That is not the use to which a mantle is exposed. Mr. Canning's second test, in which the burners were turned on and off, is the only one which approximates to ordinary conditions. A mantle in its use is subjected to the alternations of great temperature and ordinary atmospherical temperature; and these changes in temperature may have, more especially in the long mantles of the upright burners, some effect in producing the ultimate collapse of the mantle. In mantle works, we have seen mantles that have been run continuously labelled (say) 1200, 1500, and nearly 2000 hours; but in ordinary use, lighting up and extinguishing every evening, specimens of the same class of mantle have ended their life in three or four months. Then, again, the burner used has an effect on both the durability and the illuminating power of mantles. Some burner-makers do not give sufficient attention to the heads of their burners; and certain burners that have been submitted for trial have had such sharp edges round the caps that, in a few days, the skirt of the mantles has been cut away as cleanly as though it was subjected to the action of a sharp knife. It may also be suggested that the tests in the paper suffer from general acceptance through a gas-pressure of $3\frac{1}{2}$ inches being used, which is not customary, and which has, of course—being higher than is usual—some effect in enhancing illuminating power. It would, however, be of interest to learn, in view of the variations in illuminating power shown by the diagrams, whether this pressure was maintained throughout the tests. In these days of incandescent gas lighting, uniformity of pressure is a matter of the utmost importance to the consumers in maintaining the maximum efficiency of their burners without undue trouble.

Speaking a word for the manufacturers of mantles, we should strongly deprecate condemnation of any particular make upon the test of a single mantle. In the making of a mantle, it has to go through so many different processes, and through so many hands, that the dropping of a stitch in knitting, or the momentary carelessness of one of the employees, which may not be traceable by ordinary examination at the manufactory, might produce a disastrous result in the use of the mantle; and thus it may come about that a high-priced mantle may be unfairly adjudged worse in its performance than a cheap one. In these tests by Mr. Canning, there were only two bad mantles out of the ten; and one of these mantles was "made in England." The attention of our electrical friends may well be called to these tests, which cover a use of five hundred hours. After the first hundred hours, in the case of the majority of the mantles, there was a fair amount of uniformity in the illuminating power; and six of the ten at the end of five hundred hours were giving between 60 and 80 candles with a consumption of 4 cubic feet of gas—that is to say, 60 to 80 candles for an hour at 1-250th part of the price of 1000 cubic feet of gas. Who can want cheaper illumination than that?

The paper by Mr. Thomas does not lend itself to criticism. He has to maintain the supply of a mining district under conditions which do not fall to the lot of every gas engineer. For the improvement of the supply of the district, Mr. Thomas pursued a certain course, which, judging from the explanation he gives, appears to have been the best one to adopt. His paper will be of especial interest to those engineers who are not subjected to subterranean workings, and enjoy a very fair amount of confidence in the integrity of their distribution systems.

Price of Gas for Power.

References which have been made by members of local authorities to the working of municipal gas undertakings during the past financial year, seem to show that the superior claims of the consumers to the enjoyment of the profits for the production of which they alone are responsible, are coming to be pretty generally acknowledged. This, however, is only one aspect of

present-day municipal gas politics. The need for meeting the competition of private producer-gas plants is apparently making itself felt in all directions; and Gas Committee after Gas Committee are to this end proposing substantial concessions in the matter of price. Generally speaking, these are agreed to when submitted to the Councils for confirmation; but we notice that the Halifax Town Council have negatived a recommendation of the Gas Committee that there should be an all-round reduction of price. The resolution was opposed, it was stated, on the ground that there was no guarantee that extra consumption would be secured, and that an experiment which would bring benefit simply to gas consumers ought not to be made at the risk of the ratepayers. This does not seem to be very sound reasoning; and it would not be surprising if ultimately events proved sufficiently strong to induce those councillors who at present favour it to change their minds. At Huddersfield there was a proposal to reduce the price of gas, for motive power and business purposes only, to 1s. 6d. per 1000 cubic feet; and this was opposed by the Labour members because of the difference between the figure named and the charge which the general consumers are called upon to pay. A harrowing picture was drawn of the "poor man" making the profit, so that "another" might have a cheap supply. But this effort to make a "class" question of the proposal came to a speedy end—being roundly denounced by the Mayor. In the course of a stern rebuke to the offending councillor, his Worship denied that there had been "some sort of conspiracy to give much to the rich and little to the poor." He added that it was his conviction that, if they charged a manufacturer for his gas-engine as they charged the ordinary consumer for light, they were doing a gross injustice to the manufacturer. In his opinion, the Gas Committee were on the lines of demonstrable fairness as between one class of consumer and another." This, too, was the belief of nearly the whole of the councillors; only the five Labour members voted for an amendment to refer the matter back. Evidently Huddersfield is convinced—though Halifax is not—that a cheaper price will result in a greater consumption; and there is little fear that they will be disappointed.

Trouble in South Wales.

Once more there are troubles, and rumours of troubles, in connection with the South Wales miners. Various disputes have arisen in different collieries; but the most serious question is the old one of the employment of non-Unionists, which has cropped up again in a somewhat acute form. In some instances, the non-Unionists have been induced to join the Federation and pay their arrears of subscriptions; but strikes are taking place at various pits, and altogether the outlook is far from clear. It seems evident that the Federation officials have been straining every nerve to get all the sheep into the fold; and the strikes have arisen from incomplete success in these efforts. A short time ago the non-Unionists and Federationists in arrear in the Aberdare Valley numbered 807; but during the past month 109 men have joined the Federation, and 487 members paid up. At present, there are in the district 122 non-Unionists, and 87 men whose subscriptions are in arrear; and the representatives of the miners at the collieries in the Valley have unanimously resolved that work is not to be resumed until every non-Unionist has been got into the Federation. Mr. Hann, the Manager of the Powell-Duffryn Collieries (one of those which has been affected by the dispute), says that this is the third occasion upon which his collieries have been stopped; but so far from making the employers less determined not to give way upon the question, they are really more determined than ever. The men, he says, are driving the employers to take into serious consideration the advisability of setting aside certain collieries for non-Unionists. This, too, is not all, for, as already mentioned, there are several other matters to disturb the relations between masters and men—the chief of them, for the moment, being the question of interpreting an agreement recently drawn up by a committee of employers and men for the regulation of hauliers' wages. Neither side is satisfied with the agreement; and it has been suspended in all collieries where both parties have not mutually agreed to put it in force. Meanwhile, the question still remains an open one. A further element of uncertainty for the time being has been introduced by the reported decision of the Wages Committee of the Federation to claim an advance of $3\frac{3}{4}$ per cent. in wages. This will come up for consideration by the Conciliation Board at the statutory meeting on Thursday. In the event of the Board then failing to agree, the question will be referred to the independent Chairman, and his award will come into force on the 1st prox. Wages at present are at the minimum; and the demand of the men for an advance was not unexpected.

"Welfare Work" v. Co-Partnership.

A few weeks ago a suggestion was thrown out, in the Engineering Supplement to "The Times," that employers who practise what is called "welfare work" should furnish some particulars in regard to its results. The suggestion has not been taken up; and in a letter which appeared last Wednesday, Sir George Livesey expressed regret that, in the interests of British industry, this was so. He pointed out that the definite object of welfare work has not been declared; but, generally, the desire seems to be to "make the lives and surroundings of workpeople more healthy, comfortable, and pleasant, to give them opportunities for self-improvement, and to create a feeling of good-will towards their employers." Sir George acknowledges that this is a worthy object; but he questions whether it goes far enough—whether, in fact, the course taken by those who are engaged in welfare work is the right one for meeting the great need of the industrial world in the relations of capital and labour. The ideal object is to thoroughly unite and identify these two interests, and at the same time to lift the workpeople to a higher level, "making them self-reliant, coupled with the independence that comes from the ownership of property." How is this object to be best attained? Not, in Sir George Livesey's opinion, by doing something for the men, but by encouraging them to do something for themselves. He cites the cases of two firms, in one of which they help their men, whereas in the other they help them to help themselves; and he points out that though the employees of the former firm have greater comforts, they are kept dependent, while those of the latter have more freedom and greater encouragement to become better men. There can, we think, be no doubt as to which system would be the best for the individual and the country at large. Treatment of the employee in the way proposed by welfare workers is not, according to Sir George Livesey, the best method of improving his position. He must be made a partner; and then his changed position will bring out qualities which no amount of pampering will impart.

Chemistry and Bacteriology of Potable Waters.

At the Meeting of the Society of Engineers, at the United Service Institution, Whitehall, last night, under the presidency of Mr. Maurice Wilson, Dr. D. Sommerville, B.A., Lecturer on Public Health at King's College, London, read a paper on the above subject. The author introduced his subject by pointing out that it touched intimately at many points the profession of engineering. After defining normal and polluted waters, he discussed sources of supply, and laid it down as essential that owing to the frequently intermittent nature of pollution, systematic and numerous chemical and bacteriological examinations were necessary, and that no report on the safety of a water supply could be considered complete that did not include a careful examination of its source. In connection with the pollution of shallow and deep wells, Dr. Sommerville deplored the fact that too frequently, even on large estates, where the excuse of limited area could not obtain, the well and cesspool were constructed close together. Reference was next made to iron and lead in waters; and plumbo-solvency was treated at some length. Chlorine, nitrates, and nitrites, were discussed, and nitrification and denitrification fully studied. Hardness was briefly treated, and a ready method for the estimation of carbonates and bicarbonates noticed. The comparative values of the chemical and bacteriological examination of water were fully considered, and it was concluded that both had their limits of usefulness, that neither was infallible, that each was assisted by the other, and that the value of either lies in that judgment and skill put into the interpretation of the results which arises only from an intelligent use of a wide and varied experience. Domestic filters were touched upon; and, lastly, filtration on the large scale. In conclusion, Dr. Sommerville stated that the ideal treatment of a water supply was thorough protection at its source, continued protection throughout its after-history, and efficient sand filtration prior to distribution.

The Welsbach Company's Dividend.—The Directors of the Welsbach Company have declared a dividend at the rate of 5 per cent. per annum on the ordinary, and 6 per cent. per annum on the preference stock, carrying £15,000 to the reserve and £7821 forward.

NOTES FROM WESTMINSTER.

THE week has been dotted with interest. In bulk, there has not been much doing in the Committee Rooms in which "JOURNAL" readers are directly concerned; but the happenings have a high degree of importance about them. There has been a settlement arrived at in connection with the South Suburban Gas Bill, in which 13 candles as a standard has been abandoned in consideration of other matters which will prove of advantage to consumers and Company alike. Reference is made to this settlement in our editorial columns. When the full particulars are published, it will we think be found that the Company have now got practically all for which they asked in 1903. Enough is said at the moment. The land-purchase Bill of the South Metropolitan Gas Company has now been withdrawn. The Unopposed Bills Committee have refused statutory powers to the Mid-Oxfordshire Gas Company on the ground of public policy—the finance of the concern being, in their opinion, unsatisfactory. The compulsory purchase powers sought by the Pontefract Corporation in relation to the gas-works have been allowed by the Police and Sanitary Committee of the Commons; and the investigation into the London County Council Electricity Bill has had a three days' run. Further allusion to the three last matters is made below. Certain Water Bills are in the groups of Bills referred to sitting Committees; but they have not yet been reached. The Unopposed Bills Committee also advanced certain Gas Bills last week; but they have in each case been looking carefully into the capital powers sought. They have, however, been satisfied that the prosperity of the gas industry demands liberal consideration in this regard. The Sutton, Southcoates, and Drypool Gas Company's Bill was in a group of Bills referred to a Committee who commenced their sittings yesterday.

The Removal of the Sulphur Restrictions. There were several gas engineers present when, after a patient hearing, Mr. Cawley announced on Monday last week that he and his colleagues were *unanimously* of opinion that the preamble of the jointly promoted Bill for the removal of the sulphur restrictions had been proved. The Newcastle-upon-Tyne Corporation did their best in attacking the position of the promoters, which was, however, strongly fortified by the recommendation of Lord Rayleigh's Committee, that relief from the restrictions could be given without prejudicing gas consumers. After their full investigation and well-considered recommendation, though the Newcastle Corporation were within their right in what they did, the lifeless and attenuated evidence with which they made the attack was almost an insult to the Departmental Committee. There was nothing in the evidence very dissimilar to what was before Lord Rayleigh and his associates in this matter; but it was all, to use the Chairman's expression on one occasion, "somewhat indefinite so far as scientific evidence was concerned." As grains of sulphur had apparently had no effect upon the Committee at their previous sitting, Professor Percy Frankland spoke on Monday not only in grains but in pounds; but even if 1·15 lbs. of sulphur were discharged into a house in the course of twelve months, owing to the high sulphur content of the gas, Professor Frankland could not stretch his conscience further than to remark that it would be unpleasant and irritating to people in an unventilated room, and he only "felt" sure he could detect the difference between burning gas containing 10 and 60 grains of sulphur. He spoke of the constant breathing of an irritating gas like sulphur as being deleterious, as though people were in the habit of, from morning to midnight, sitting in an atmosphere in which such gas was being consumed. Dr. Armstrong and Mr. W. J. A. Butterfield next gave evidence; the latter referring to certain incrustrations that he had discovered on the metal work of inverted burners. But the Chairman was not satisfied with the illustrations of ill-effect. Mr. Butterfield also sought to correct certain tables put before the Departmental Committee; mentioning that towns were not included where he knew lime purification was in use—notably Croydon and Oxford. We think Mr. Butterfield will find that Croydon and other places have discontinued lime purification since those tables were before the Committee, without anyone being any the wiser, or feeling any the worse. In one case of which we know, lime is now used merely for the abstraction of carbonic acid, so that in that case the consumer is not injured even to an additional 2 per cent. in his consumption of gas. Speaking of the evidence generally, it was prepared to create an impression on the lay mind; but the lay mind was not in this instance impressionable. The four members composing the Committee, as has been announced, were unanimous in approving the Bill, which was read a third time in the House last Thursday and passed. Into the Joint Bill a clause is to be introduced, containing the terms of an agreement come to between the Wandsworth Gas Company and the London County Council and the local Borough Council; this course enabling the withdrawal of the Special Bill of the Wandsworth Gas Company. It was whispered in the lobby towards the end of the week that the Newcastle people are strongly inclined to go to the Lords, even though the past winter has not brought about any noticeable deterioration in the health of the people of London, who are now, as in all other places, burning less gas than formerly per house, thanks to the incandescent burner. What must have been the discharge of sulphur into the atmosphere in the good old days of unscientifically constructed flat-flame burners, before a "chemists' fad," as Sir George Livesey describes it, was imposed on a few companies? The wonder is, when we come to think about this terrible gas that our grandfathers used with impunity, that many of us ever had existence.

Compulsory Purchase. It is not frequently that before the Police and Sanitary Committee of the House of Commons, there is anything of more than ordinary importance calling for attention in these notes; but in the latter half of the past week, there was discussed before them a somewhat momentous issue. The Pontefract Corporation have cast their eyes on Naboth's vineyard—Naboth being in this case the Gas Company; and this Naboth, as of yore, is unwilling to part with his inheritance. Seeing that the Corporation cannot commit such violence as the slaying of the Gas Company to obtain possession, they have, in an Omnibus Bill in Parliament this session, asked for powers of compulsory purchase; and this is a statutory concern. It cannot be denied that the Company have not shown that vigorous growth that most gas undertakings have during the past twenty years or so; and it seems further clear that, until the beginning of last year, the Company were not altogether so enterprising as they might have been. Since Mr. Laurence Whittaker, however, has been Manager, the slot meter consumers have increased from 114 to 450; and his evidence shows that he appreciates, and is working in, the directions in which a considerable increase of business may be developed. The Company is a maximum-dividend one; and are now supplying at 2s. 11d. The capital expenditure is high at present; being some £37,000, with a consumption of 41 million cubic feet. But the works are in excess of present requirements—especially in the carbonizing department; there being 79 retorts, while the greatest number in use last winter was 42. But if the development of business proceeds, the difference between these two figures will soon be narrowed down. All other parts of the plant are also said to be in excess, even to the gasholders. But this is not the view of the Engineers who appeared for the Company. This excess and a general complaint of a want of up-to-date administration in past years, appeared to be the sum and substance of the case that was gone into with great minuteness before the Committee. Mr. E. H. Stevenson was one of the witnesses for the Corporation; and he pointed out certain comparative facts relating to maximum-dividend and sliding-scale companies, whereby the consumers under the latter are benefited. The Company have not been in Parliament for 33 years; and therefore it may be expected that they will soon be coming for the modern powers relating to gas supply, when the sliding-scale could be applied, and the consumers obtain all the advantage of the application of that principle to the business. The same assurance of benefit there can never be under municipal control. There was really no case made out by the promoters to justify the Police and Sanitary Commitee allowing, as they have done, this part of the Corporation Bill to proceed. The evidence of Mr. Corbet Woodall, Mr. Henry Tobey, Mr. Whittaker, and Mr. Drew showed the weaknesses; and the manner in which the Committee gave their decision seemed to indicate that they were not altogether clear that they were on very sure ground. Though not called upon to do so, they gave reasons for their decision—reasons which they evidently realized were most problematical in character. They only "felt" there had been some want of enterprise on the part of the Company, which had "probably" resulted in the public suffering, not only in the price of gas, but "possibly" also in inconvenience of supply. Are these sufficient reasons for sanctioning compulsory purchase? How the question of "inconvenience of supply" can be reconciled with the "excess" of works, it is not our business to determine. The reasons given fitly companion the evidence that was adduced in favour of the Corporation. Perhaps a Committee of the House of Lords will discover stronger reasons for the maintenance of the Company's control, rather than permit of municipal trading to the prejudice of the consumers. Mr. Stevenson himself does not look for any immediate reduction of price if the concern gets into the hands of the Corporation; for, in a sentence composed of plenty of latitude, he said that, in the event of transfer, "after a time," when "some" of the borrowed money has been repaid, would come a reduction.

Mid-Oxfordshire Bill Rejected. There will be universal satisfaction in the gas industry that the Bill of the Mid-Oxfordshire Gaslight and Coke Company, Limited, has been rejected—the Unopposed Bills Committee presided over by the Chairman of Ways and Means (Mr. Alfred Emmott) having declared that they considered the finance of the concern so unsatisfactory that, on the ground of public policy, they must pronounce the preamble not proved. With all the private pestering of gas shareholders, and shoals of prospectuses issued, the promoters told the Committee they had "acquired," whatever that may mean, £6500 of share capital and £19,550 of debenture stock; while the share capital alone mentioned on the prospectus was £50,000. However, Mr. Emmott, his colleagues, and Sir Chandos Leigh had been trying to fathom the depths of the prospectus and the Company's position; but their soundings have not given them much information. Nor did the evidence afford them any satisfaction. There are more people, too, than Mr. Emmott who are curious to know something of the position of the Finance and Construction Company, Limited, in which the founders' shares are held by Messrs. E. O. Preston and Co., who are "interested in the profits made upon the sale to this

Company of the undertakings of the Shipton and Charlbury Companies as beneficial owners of all the shares in those Companies." Then there is the Water and Gas Securities Company, Limited, who were some time ago privately and actively touting for subscriptions to the Mid-Oxfordshire Company. There may be interest here for anyone who cares to take the trouble to trace the relationships of these various concerns. In the prospectus there is an agreement to pay no less a sum than £17,500 to the Finance and Construction Company for the promotion of the Company, the construction of works, and the stoppage of "gas leakage." Of the sum named, they are taking £6500 in shares, and the rest in cash. Many peculiarities as to the finance of the Company were unearthed during the proceedings before the Committee; but in spite of the acumen of Sir Chandos Leigh, he had to confess that his many inquiries had not enabled him to learn anything as to what the existing Companies were charging for gas, or any details as to the working of the undertakings. There will be general gratification in the gas industry that the Unopposed Bills Committee have used their power and position to, on the high ground of public policy, pronounce the finance of the concern unsatisfactory, and to refuse the Company statutory powers. They have done all they could to protect the public; but some of the public have evidently parted with their money—many of them possibly on the strength of the feature made in the prospectus of this application to Parliament. Parliament has said its last word; and it should be a caution to investors in gas concerns not to be too hasty in investing in undertakings as to the stability of which they know nothing.

L.C.C. Electricity Bill. Looking into the Grand Committee Room of Westminster Hall last week, the scene presented might have suggested that time had been set back by several months; for it was altogether similar to what met the eye when the question of electricity supply in London was being threshed out there last year. But there has been a General Election since; and instead of the Bill of the Administrative County of London Electric Power Supply Company forming the *corpus* of the inquiry, a Government favourable to municipalization have given to the Bill promoted by the London County Council the privilege of sole appearance before the Hybrid Committee of which Mr. Luke White has been made Chairman, have crushed out of existence a partially competing scheme owing to the impertinence of the promoters in asking for fair play, and have given a back seat to the Administrative Company as petitioners against the County Council measure. There are over 80 petitioners against the Bill, of whom, as will be seen from a short report in our "Parliamentary Intelligence," nine are Gas Companies. Some 36 of the petitioners are local authorities; including quite a number of the Borough Councils. This does not look as though the local authorities have any great faith in the measure being of assistance to them, as the County Council make a strong point of suggesting it will be. Most of the Electricity Supply Companies are there in opposition, as are also the Metropolitan Water Board and the Hydraulic Power Company. It is a great and strong host that has risen in opposition to the County Council; but the County Council are contented, for has not the President of the Board of Trade said that, in such a matter as this, a scheme of the ratepayers should first receive consideration? Of course, it is a small matter that this is not a scheme of the ratepayers; it has never been submitted to them; nor is there any machinery for compelling such a course to be taken. The area the Council have mapped out for their operations extends down the river beyond Erith and Grays, covers something like 387 square miles, and the capital expenditure under the Bill is expected to be £2,370,187. This it is thought—for it is all speculative and in the air—will suffice for the period ending 1913-14. Strange indeed would it be if the Council's estimates and expenditure had in this instance any correlation. The Committee sat Tuesday, Wednesday, and Thursday, and will resume to-day. The other interesting matter that calls for attention in these "Notes" this week compels the deferring for a week a sketch of some of the points of the Council's measure.

Effect of Frost on Open Filter-Beds.—The uncovered filter-beds at the Pettaconset station of the Providence Water-Works were so influenced by the frost during last winter, though it was an open season, that, according to "Engineering Record," it has been determined not to construct any more without covers. Seven beds have been in service; and experience with them shows that the frost retards the rate of flow, increases the cost of cleaning, and lowers the bacterial efficiency. Another bed has been practically completed; but before the sand is placed in it, a cover will be constructed. Two more beds have not yet been ordered; but when they are, roofs will be erected over them. When the works were designed, it was uncertain whether covers would be necessary; and it was accordingly determined to go without them as an experiment, for by omitting them the cost of construction was considerably reduced. Another fact that the operation of the works has shown is that the silt in the raw water causes the sand beds to clog more rapidly than was anticipated; and, for this reason, it is probable that two more beds, making the full number of ten for which the works were designed, will be ordered before long. The beds have to be cleaned after three weeks' operation, instead of running four weeks, as was expected.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 394.)

No improvement was apparent last week in the general situation of things on the Stock Exchange. Nearly all the old sources of anxiety were still active (except that the Russian loan was off the mind), and at least one—the money question—was rather more acute. The week was mutilated by the May Day closing on Tuesday, which rendered Monday almost a *dies non;* and the re-opening on Wednesday was made heavy by the state of the American market, bringing other prices down sympathetically. The atmosphere was somewhat cleared on Thursday by the action of the Bank of England; and thenceforward till the close things ruled more shifty and sensitive. In the Money Market, the feature was the raising of the Bank rate on Thursday to 4 per cent. from the 3½ per cent. rate which had lasted four weeks only. This measure was rendered inevitable by gold withdrawals for the United States; and it remains yet to be seen whether it is sufficiently drastic. Business in the Gas Market was decidedly interesting, and, in point of volume, showed a good advance on recent averages. The centre of attraction lay in Gaslight and Coke ordinary, which had been smartly attacked the week before. It opened dull on Monday at 95½, but was better at the close of the day. On Wednesday, there was a sharp struggle, and a large number of transactions took place. Although the stock was once got down to 95½ again, yet before the day ended it was evident that the worst was over. On Friday, there was a good bit more dealing, which shaped upwards; and on Saturday the stock changed hands at 97⅜—a rise of 1 in the quotation. The secured issues meanwhile lay very quiet. The maximum was done twice at 87½ and 88½; the preference twice at 107 and 108½; and the debenture once at 87 (a fall of 1). South Metropolitan was only moderately active, and was unchanged. Transactions marked showed prices ranging from 125½ to 127. The debenture changed hands at 87½. Commercials were again very quiet, and inclined to droop for lack of support. The 4 per cent. was done at from 114 to 115½; and the 3½ per cent. at 110—a fall of 1 in each. The debenture marked 85½. There was very little doing in the Suburban and Provincial group; and there were no movements in London prices. Brentford new marked 202 and 197; and ditto preference, 125 free. British was done at 42. On the Liverpool Exchange, Shrewsbury advanced a point; but the quotation wants drawing in to a reasonable width. In the Continental Companies, not much business was done in Imperial, and the tendency was weaker. Prices ranged from 237 to 235½—a fall of 1. Union was not touched; but European was active and buoyant. The fully-paid shares were done at from 23¼ free to 24⅛; and both they and the part-paid shares advanced ¼ in quotation. Among the undertakings of the remoter world, Cape Town was done at 17, and the 6 per cent. mortgage advanced 1. Melbourne 5 per cents also advanced a point. Buenos Ayres changed hands at 12¾ and 12 11/16, ditto debenture at 98, Primitiva ordinary at 6¾ and 6⅞, ditto preference at 5¼, ditto debenture at from 98¼ to 99, River Plate at 13, ditto debenture at 99, and Monte Video at 11 13/16.

The closing prices are shown in our Stock and Share List on page 394.

ELECTRIC LIGHTING MEMORANDA.

Public Lighting Controversy at Hastings—Candle Powers, Costs, and Efficiencies—The Interest of the Ratepayers—Recognition of the Advances of Gas at Tunbridge Wells.

As we fancied would be the case, the reintroduction of the question of electric street lighting into the Hastings Town Council has raised a public discussion which will not improve the comfort of those responsible for the unwarranted expenditure on electric lighting in the borough streets. In the "Hastings Observer" (which paper, by the way, is doing good service in ventilating this matter), some common-sense comments were a fortnight ago made by one correspondent; and our contemporary also gave place to the recent criticisms of the "JOURNAL" on the subject. The following week, an "informant" (evidently someone closely identified with the Corporation Electricity Department) and a Mr. Pell, who is an electrical engineer hailing from the suburbs of London, sent a harmless broadside into the position taken up by the advocates of economy and efficiency, who have raised objections to municipal extravagance in street lighting. The arguments of these gentlemen are stale to the point of mustiness. We have heard the like of them times out of number, and have read them until they have become ineffaceable from memory. Candle powers per annum and prices have been sprinkled throughout the letters of the electrical correspondents to an extent that must be perplexing to the ordinary ratepayer, to whom the way the electricians have of putting these matters is about as clear as the inscriptions are on the ancient monuments of Egypt to all who are not versed in the science of Egyptology. Besides trying their best to confuse the ratepayers, the electricians who are backing up the electrical profligacy of Hastings withhold all information that adversely affects their case. They are not to be blamed; but it is not good for the ratepayers,

who we have a lurking suspicion are the employers of one of the correspondents.

In the first place, the gentleman who was described as "our informant" in the "Observer" states that if the Gas Company had to light the lamps on the sea front of Hastings, it would cost a considerable amount—seeing that one of the electric arc lamps on the front equals "about 1200-candle power," while an ordinary gas-lamp is equal to "about 50-candle power." Therefore, one arc lamp is equivalent to about 24 gas-lamps. Then this "informant" multiplies the £3 3s. charged for an ordinary gas-lamp by 24, to show that, under such circumstances, the cost would be considerably higher than the more than £40 and upwards paid for the electric arc lamps, of a large part of which we repeat the Corporation have, through continuing the lamps in use, been robbing the ratepayers. This informant who makes such statements without divulging his identity knows perfectly as well as we do that, if the Gas Company were competing with the electric arc lamps, they would use incandescent gas-lamps of the high-power type, and not of the ordinary class. But we will meet the informant on his own ground, and think we can prove that the ratepayers must take his statements with a grain of salt. Mr. Pell excuses the cost of the electric arc lamps on the ground that they are of an old type—twenty years old, in fact, the informant states. They cannot therefore be very efficient; and experience proves that these arc lamps fall away with conspicuous consistency with time in the matter of their illuminating power. And there is no preventing this, as there is in the case of a mantled gas-lamp, by the simple process of occasional cleaning.

Yet these antiquities in arc lights are spoken of as being so virtuous that they now give 1200 candles. We have seen those lights, and know it is absurd to talk of them being of anything like that value. We have also in memory some tests a number of years ago, in which these very lamps gave an average illuminating power of under 400 candles. But more striking evidence than this is to be found in a report in 1900 (we think it was), when the then Borough Electrical Engineer stated the illuminating values of the lamps as follows: 15 ampère arcs, 500-candle power; 12 ampère arcs, 400-candle power. Arc lamps that, with advancing years, can improve their illuminating power from 500 to 1200 deserve a place in one of the national museums. Perhaps the informant, or the Electrical Engineer if he is not the informant, will show how this appreciation of the candle power has come about. It would be very instructive. Supposing that at this time of day the lamps are giving about one-third the candle power ascribed to them by the "informant," eight ordinary incandescent gas-lamps would easily compete with them; but ordinary lamps are not what would, in our opinion, be used. It is apparent from the charge made at Hastings—it is the heaviest in the Kingdom so far as we can trace, the rule being about half the sum—that the ratepayers have been robbed; and it is not a justification of that charge to say that it is due to the lamps being about 20 years old. To keep lamps going for that number of years that cost the ratepayers year after year between £40 and £50 each, is a monstrous dereliction of duty on the part of the Corporation, and a shameful disregard of the interests of the ratepayers. It is said there has been barely a profit on them. Then how is it that even in the case of electricity companies supplying municipalities, the cost per lamp has not been anything like the figure the ratepayers of Hastings have been paying?

Much is made of the figures of Mr. Leon Gaster as to the cost of various illuminants per candle power; but it is Mr. Gaster himself—the controversy shows this—who makes a great feature of the renewal of electric lamps to effect economy. These lamps at Hastings have been shamefully wasteful of current; and it is the Electricity Department that all too long has been paid for that current. It would have been better for the ratepayers if the loss had been cut years ago, though it might not have been for the Electricity Committee, who wanted to keep their plant working as fully as possible. Just one word more as to the nonsense that is talked about the cost per candle power per annum. If electric lighting is so cheap on this basis, then how comes it that the cost works out to such an extravagant sum per mile? Every intelligent man must see that if each candle of illuminating power is so cheap, then, unless the candle power is wasted, the expense of street lighting should be lower than by any other system. Before the ratepayers are satisfied with such fencing with the truth as this candle-power-per-annum business is, let them compel a really plain, defensible answer to the question and point.

In the controversy, the relative efficiency of the two forms of lighting—gas and electricity—is brought forward. It is stated in our contemporary by one of the "advocates" of the latter system, that efficient street lighting, to his mind, is to illuminate the streets so that objects may be easily seen, and also that the lamps be placed advantageously so as to minimize shadows. With him in this we are in absolute agreement, but not when he says that his ideal can be more easily accomplished by electricity than by gas. It will, it may be anticipated with confidence, be conceded by most people in Hastings that for importance, for heaviness of traffic, and so forth, there is not a street in the town to match Oxford Street in London. The lighting of this street comes within the jurisdiction of the Marylebone Borough Council; and notwithstanding that the Council are the owners of an electricity undertaking purchased on more onerous terms than those paid by Hastings, the Lighting Committee have recommended incandescent gas-lamps for the lighting of that magnificent thoroughfare. Why? Because—these are not our words, but the Committee's—"the lighting of the street will be more evenly diffused, and much more effective by this system than by electricity." And in the busy City, again, better diffusion is one of the recommendations that has strongly appealed to the Corporation, as illustrated by what is being done in Queen Victoria Street, across the bridges, and elsewhere. Electrical people always point, in their comparisons, to the ordinary incandescent gas-burners in use in Fleet Street, and attempt to ignore those of the high-power type. The "dazzling" effect of the incandescent gas-light is spoken of in the correspondence; and yet—this is rather laughable—the Hastings Corporation are proposing to adopt in certain streets flame arc lamps! The "dazzling" effect and jerky behaviour of flame arcs in London are execrated by police and drivers alike. Showy lights spotted here and there may be attractive; but they do not represent good diffusion and uniform lighting, and the policeman is yet unborn who with a street illuminated by the "dazzling" flame arc lamps could stand at one end, as is suggested, and see what is going on at the other end, and in the intervening shadows. It is no use whatever judging of lighting effect by a single light, or group of three or four lights. One of the controversialists speak of the reflective power of the buildings, in the case of high-pitched arc lamps. It is very kind of the buildings to come to the aid of these lamps in this way, and from their vertical sides to reflect the light downwards! For the convenience of the electric arcs, and to get this reflective power, the Corporation will perhaps consider the feasibility of erecting buildings along the parade.

One other point affecting the interests of the ratepayers; and this is an aspect of the question that should appeal to ratepayers in every town in which there is a municipal electric undertaking. The "informant" of the "Observer" said that "it was certainly to the interests of the ratepayers, except those who were shareholders in the Gas Company, for the Council to do its own electric lighting, seeing that the undertaking belonged to the ratepayers." That is the common reasoning of municipal electricians. But it surely can only captivate those ratepayers who do not think for themselves. The matter should be put in this way: The ratepayer has to pay for the public lighting. Having to pay (whether he likes it or not) his share as a townsman, it is to his interest to have that light purchased at the cheapest possible cost compatible with efficiency. What does the ordinary ratepayer profit by having to pay something more in the pound for his public lighting through patronizing the electricity undertaking? We have tried to find out, but have failed. If the argument of the electricians is followed to its logical conclusion, the ratepayer or the taxpayer ought to feel honoured rather than rebellious whenever his rates and taxes are increased, because through the increase he is contributing to the revenues of his own town or his own country. While he is only one out of many, every householder is a part proprietor—though perhaps he cannot put his finger upon any one part outside his private goods and chattels, and say "this is mine"—of his town and country; and therefore, so argue these interested electricians, he ought not to grumble but to have pleasure in contributing more than efficiency demands through his rates and taxes.

But there is another point which shows how illogical these controversialists of the "Observer" are. After what has been said about the undertaking "belonging" to the ratepayers, it is pointed out that, "although the concern is the Corporation's, none of the money in the concern is the town's; it having been raised on loan." Broad is the way that leads to the destruction of the arguments of these electrical disputants. Let us see what this contention brings us to. The ratepayers have, in the days when the sale of current did not enable the undertaking to pay its way been handing out between £40 and £50 for each arc lamp; and we believe for what is only partial night lighting. These arc lamps run away with the current at an abominable rate; and, therefore, in paying this £40 or £50, the ratepayers have been assisting in the maintenance of an undertaking the investment in which does not, it is said, belong to the town, and the money derived from which has been going into the pockets of the people who have so invested their capital. There have been years, too, during which the ratepayers in addition to contributing to the making of that interest through the public lighting have had to make good deficiencies in the amount required for capital charges. What becomes now of the argument about ratepayers patronizing their "own undertaking," rather than selecting the cheapest and most efficient illuminant? Even on the last-issued accounts only a "profit" of £117 was made. But that so-called profit was made at the expense of the ratepayers generally; for if the undertaking had, like any other trading concern, paid its proper quota to the rates, there would still have been a deficiency, and, while the undertaking does not pay its full quota, all those ratepayers who are consumers of gas or oil are being injured for the advantage of the electricity consumers. In the course of the arguments of the electricians, the gross profit of the electricity undertaking is compared with what obtains in the case of a company; but it must be remembered—take the Gas Company as an example—that a company's gross profit is only arrived at after very liberal allowances for depreciation, repairs, and maintenance have been made, and the fullest amount of rates and taxes that can be squeezed out of them has been paid. The rates and taxes of the Hastings electricity undertaking—it is not creditable to those responsible for these things that we should be able to say

it—only amounted in 1904 to £152. If the undertaking had been properly assessed, and rates and taxes paid upon that assessment, where would the £117 "profit" have been? The undertaking, too, provides no depreciation, and the repairs and maintenance in the year named was at a reduced amount. Compare that position with the local gas undertaking, which paid, we calculate, during the seven years ending 1905, in local rates some £20,000, and, in addition, coal duty equal to about £25,000. The ratepayers of Hastings have not yet got to the bottom of the finances of their Electricity Department.

Hastings to Tunbridge Wells is not a far cry. The Electric Lighting Committee of the latter town have the satisfaction of reporting an increase in the net profit on their electric lighting undertaking. We have not the figures at hand to see whether the net profit can be completely so described; but anyway the Committee deserve congratulation on the improved position by reason of their policy in maintaining the prices for electricity until they were fairly in a position to recommend a reduction. If the Chairman of the Tunbridge Wells Electric Lighting Committee (Alderman Robb), when he was mentioning in the Council the improved conditions of the concern, had been "talking at" the Hastings Corporation Electric Lighting Committee, he could not have chosen language which better fitted the department than that which he employed. The report of his remarks reads—

He believed that many of the municipal electrical undertakings in the country were absolutely insolvent if audited on a commercial basis; and it was, therefore, very satisfactory that they in Tunbridge Wells could show such a good result. They never knew when their plant might be out of date by the progress of science; and they had to reckon with the great improvement in street gas lighting. He, in his more enthusiastic days, believed in electric lighting for side streets; but there was no doubt that the saner electric engineers realized the advantage of gas. The Committee must, therefore, be very careful on the financial side.

Another member complimented the Council on the profits being earned from private lighting, and not from street illumination. These are all statesmanlike remarks, and stand in striking contrast to the puny efforts made in the Hastings controversy to belittle the advances of incandescent gas lighting.

MUNICIPAL ELECTRIC LIGHTING AT WORCESTER.

The Worcester Corporation have not been fortunate in the management of their electric lighting business. They began with a policy which is now admitted to have been mistaken; and while, under one influence and another, they have fluctuated between various remedies, they have never yet succeeded in overcoming that initial error. When the works were established in 1894, great hopes were entertained in some quarters of the possibility of generating electricity economically by means of water power. Worcester was induced to give the system a trial, and placed its generating station on the banks of the River Teme, 4 miles from the city. So far as the water of this stream was available, the result does not seem to have been unsatisfactory. The electricity generated was cheap, though perhaps not quite so absolutely costless as had been expected by some of the more sanguine supporters of the system.

The difficulty began when it was found that the water power was insufficient to maintain a constant supply of electricity. To make up for the deficiency of power when the river runs low, as it frequently does, an auxiliary steam plant was laid down. This proved exceedingly costly, because of the expense of carting coal and other material, and the necessity of keeping the boilers and machinery always in readiness for starting work at short notice. There were also extra loss by leakage and other expenses arising from the maintenance of works away from the city. Thus it came about that, when the advent of electric tramways led the Corporation a few years ago to consider the question of extending the electricity plant, it was decided to establish new works near the city, with steam as the generating power. The original works had been so far kept going on absolutely the old lines; but the inconvenience of having two works has been so apparent that it has now been decided to concentrate the whole of the steam-generating plant in the new building, and to keep the old station for water power only. As it is claimed that current generated by steam can be produced at the new works at half the cost of the old works, the City Council recently adopted the change without much demur. It will, however, cost the ratepayers a pretty considerable sum to carry out the change. A good deal of plant will have to be put on the scrap heap. Someone has unkindly suggested that it might afford a useful lesson in municipal management if this were piled up in one of the public squares of the city, where the citizens might see it.

Another suggestion, which was brought formally before the Council, was that steps should be taken to cut the loss by selling the undertaking. The ratepayers have had to pay in direct subsidies the sum of £3894 (an average of £360 a year) towards the maintenance of the works; while the cost of street lighting has gone up by £1375 a year, which is, in the main, a contribution to the Electricity Department. There are great hopes that, under the new conditions of working now proposed, all this will be rectified, and loss will be replaced by profit. There have been similar anticipations before; but the municipal trader is nothing if not hopeful. The proposal to sell the works, therefore, found only moderate support. Worcester is nevertheless not a place to which supporters of municipalization are likely to turn their steps when in search of examples to bear out their theories. Nor is it one for which the electricians can take much credit. The electricity undertaking has not only been a burden on the ratepayers, but it is likely to continue so unless means can be devised for reducing its enormously inflated capital, much of which seems to represent discarded plant.

PERSONAL.

RETIREMENT OF MR. JOHN GEORGE GLOVER.

In connection with the retirement from the directorate of Messrs. Glover and Main, Limited, of Mr. John George Glover, whose son, Mr. Thomas Glover, has been elected to fill the vacancy on the Board, a very pleasant function took place at the registered offices of the Company, No. 49, Queen Victoria Street, E.C., on Saturday, when the staff presented him with a life-size portrait of himself by Vandyk, and an illuminated address. Mr. William Batt, in making the presentation, referred to the close relationship which had existed for so many years between Mr. John Glover and the staff, and the uniform kindness which he had always shown to them. In asking his acceptance of his portrait as a slight token of their esteem and regard, he expressed the hope that, though he was no longer to be so intimately associated with them, they would occasionally have the pleasure of seeing him. In conclusion, Mr. Batt, on behalf of the staff, sincerely trusted that Mr. Glover would be spared for many years, and that the future might hold much happiness in store for him. Mr. John Glover, who was deeply touched by the words which had fallen from Mr. Batt, warmly thanked the staff for their kindness in presenting him with the portrait and address, and said he should always look back to what had taken place that afternoon as one of the brightest spots in his life. He was deeply grateful to the staff for the way in which they had stood by him in years gone by; and he trusted that, though he had now ceased to take an active part in the management of the business, the greatest possible assistance would always be rendered by the members of the staff to promote the welfare of the firm. A vote of thanks was proposed to the Chairman (Mr. B. W. Marsh), and this brought the interesting proceedings to a close.

Mr. James D. Keillor, assistant to Mr. James Kincaid at the Kirkcaldy Gas-Works, has been appointed Manager and Collector to the Lochgelly Gas Company, Limited.

We understand that Mr. A. R. Burch, the Engineer and Manager of the Uxbridge and Hillingdon Gas Company, has been appointed Engineer to the Bombay Gas Company, Limited, in succession to Mr. F. W. Chamberlain, who, as already announced in the "Journal," has relinquished the position on account of ill-health.

We learn that Mr. J. H. Brown, the Gas Engineer to the Nottingham Corporation, has been awarded the London Gold Medal by the Council of the Institution of Gas Engineers, for the paper on "Experiments with Low-Grade Mixed Gases," read by him at the meeting last June. The paper, it may be remembered, gave the particulars of some interesting investigations carried out by the author, and was accompanied by a valuable series of tables recording the results. We congratulate Mr. Brown on the recognition he has received of the utility of his labours to his colleagues in the gas profession.

Mr. Harold Smith, who for the past eight years has been Chief Assistant to Mr. H. Simmonds, at Bury, has been appointed Gas Engineer and Manager to the Bingley Urban District Council, in succession to Mr. E. H. Swain, who, as already announced in the "Journal," has entered the service of the Pontypridd Urban District Council. Mr. Smith has been employed at the Bury Gas-Works since he left school at the age of 16, and has received a sound practical training in every department. He holds honours certificates in "Gas Manufacture," "Chemistry," and allied subjects, and has acquired the greater part of his knowledge of gas engineering and manufacture from his present chief. He has been for upwards of six years on the Council of the Manchester and District Junior Gas Association, of which he is an ex-President; and it was owing to his suggestion that a special class in "Gas Engineering" was formed at the Manchester School of Technology.

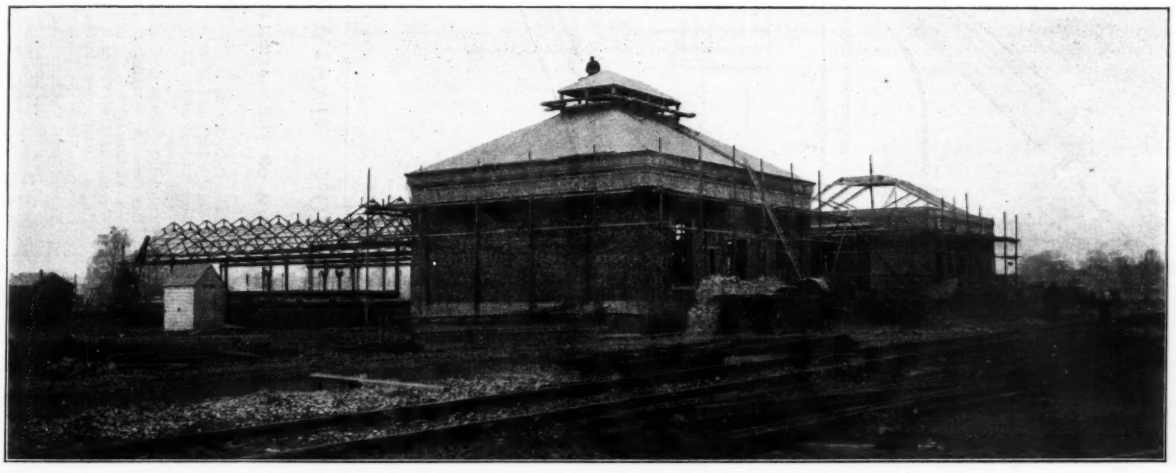
Manchester District Institution of Gas Engineers.—The next meeting of the Institution will take place on Saturday, the 26th inst., at Huddersfield. The members are invited to inspect the gas-works at Huddersfield and Longwood, and also the Technical College in the former town, where the members will be received by the Mayor. Professor Smithells, of the Leeds University, will deliver a lecture on "Smoke and Fog." Mr. H. Kendrick, the Hon. Secretary of the Institution, states that the only other item on the programme will be the discussion on the Question-Box answers. Luncheon will be served at the Huddersfield Gas-Works; and members are invited to dinner at the George Hotel, by the Directors of the Longwood Gas Company.

THE OLD AND THE NEW WORKS OF THE COVENTRY CORPORATION GAS DEPARTMENT.

For gas-manufacturing purposes, the old gas-works in Gas Street, Coventry, are condemned; and it will not be many months hence before the last charge of coal will have yielded there its contribution to the commodities in which the Corporation Gas Department deals. The works have in times past, when the requirements for gas for industrial and domestic purposes were not so large as now, served the ancient city well, but, we fear in latter years, somewhat uneconomically. Their arrangement was no doubt originally good for the then methods of working; but they are to-day unsuited to the realization of the ultimate economy procurable from modern methods. It would, however, be impossible to so reorganize and modernize the works as to secure the maximum of economy, even if the ground were cleared and the works reconstructed anew. The area itself with such a large business as that of the Gas Department would circumscribe operations; and what is more, being situated almost in the heart of the city, hemmed in, and not immediately in touch with rail or water communication, the site is badly circumstanced for a manufacture depending so largely for its highest success on the handling of material in the least costly manner. Take coal for example. Here we have a works sending out about 700 million cubic feet of gas per annum; and all the coal that is required for this considerable make has to go through a tortuous and varied system of transport before it eventually finds itself in the retort-houses. The railway sidings are ¼ mile from the works. Therefore, from these sidings the whole of the coal has to be carted. It is then delivered at one end of the works, there dropped into shoots, delivered into small waggons, which are run on narrow-gauge rails, and are tipped into the coal-store. There it has to be picked up again as required; and the coal that is not elevated for the feeding of the inclined retort hoppers has to be barrowed into the horizontal retort-houses. This uneconomical method of handling material is, of course, the result of circumstances the foundation of which was laid by the original adoption of the site; and with the growth of the business, the penalty inflicted by the inconvenience has increased in proportion to the additional material to be transmitted from siding to store.

Looking round the works, they give one the impression of the best having been made of a bad situation; and of a great amount of ability having been expended in packing the maximum of plant into the minimum of space. But the result is a cramped feeling everywhere. This again does not tend to that economy which freedom in working produces, nor does it conduce to that easy repair and constant attention which in manufacturing plant of any description promote preservation and the continuance of good working.

These are some of the impressions made on a visit to the old works preceding one to see the progress of the new ones, which, none to soon, the Corporation are carrying out at Foleshill, and which, when the first section is completed, will emphasize to all concerned the truth of what is here written. These are times of transition in connection with the Coventry Gas-Works. A long chapter in their history is just being brought to a close; and in a brief period a new one will open. It is the object of this article to give an account of what is being done as a preliminary to this change in the condition of the Gas Department; and this will no doubt be useful to the many members of the Midland Association

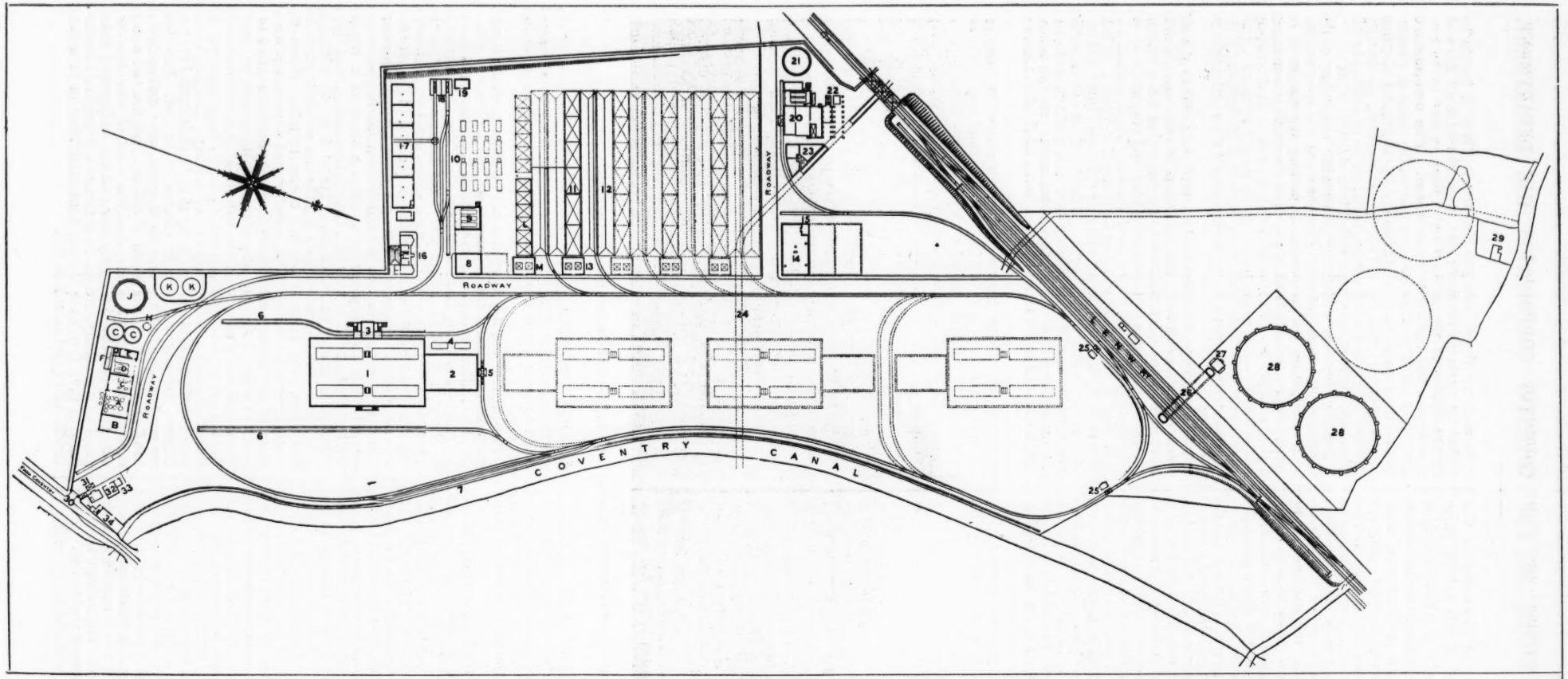


Meter-Houses, Purifiers, and Revivifying Sheds at Back, in Course of Construction—May 3, 1906.

of Gas Managers who will take advantage of the opportunity that will be offered them, by their excursion meeting on May 17, to visit Coventry and see the extensive and comprehensive scheme that their President (Mr. Fletcher W. Stevenson, M.Inst.C.E.) has in hand for the Corporation Gas Department, of which he is the official head.

But before going to Foleshill, and as a large part of the old works of whose congested state we have been speaking will before long go the way of all mundane things built by human hand, it will perhaps be of both present and future interest to put upon record a few particulars concerning them. The works stand upon 4¼ acres of ground; and during last winter the maximum daily make was 3¼ million feet. Stepping into the retort-house, one is at once struck by the arrangement of the plant. Here, within what is practically a single building, there have been three examples of ancient and comparatively modern systems of gas making working as it were side by side. Built athwart one part of the house are three short benches of hand-charged retorts, workable specimens of antiquity, but still not now economical through their general arrangement. Two of these benches contain six beds apiece of sixes; and the other bench five beds of nines. This transverse building of the benches had, in pre-mechanical stoking days, its advantages, because of the ease it gave in wheeling in coal and wheeling out the coke; and it is obvious that the original designer of the house kept the question of facilitating work, as it was carried on in that day, conspicuously in view. The coal-store is removed from the retort-house by a roadway; and the roadway then assisted considerably in giving freedom to the operations of carbonizing. But new systems cannot always be adapted to old conditions in a manner to derive the maximum of efficiency and economy. The settings are all of them worked by one furnace; and the retorts are blocked. What must produce some amount of awkwardness in the operation of the retorts is that, while the latter are of ⌂ section, some of the mouthpieces are round and others oval. This hand-charged retort-house is credited with a capacity of 2 million cubic feet per day.

Passing into the adjoining house (the two, as we have said, practically constitute one building), we find on the one side a bench of inclined retorts and on the other the carburetted water-gas plant—now being dismantled for modernizing and re-erection by the makers (Messrs. Humphreys and Glasgow) at Foleshill. There were two sets of carburetted water-gas plant, each being capable of producing 600,000 cubic feet per day. It is not often that one finds a carburetted water-gas plant located in a retort-house in this fashion, and separated from the inclined-retort bench by only a wooden structure. Such a situation is not the one that the former Engineer (Mr. George Winstanley) would have preferred to select; but, when consumption demands additional plant for output, and when there is only one available place for that plant, then there is but one course to take. Hence the peculiar arrangement of having a carburetted water-gas plant of about 1½ millions capacity directly facing the discharging side of a bench of inclined retorts. Regarding the inclined-retort bench, this was, if we remember rightly, one of the first installations in this country to be erected, as very early Mr. Winstanley was an ardent advocate of this system of carbonizing. The bench comprises twelve beds of sixes, 26 in. by 16 in. by 16 feet; and the productive capacity per day is 900,000 cubic feet. Therefore, we see how huddled together, so to speak, were the benches of hand-worked retorts, the bench of inclines, and the two sets of carburetted water-gas plant. And the worst of what has been cannot be appreciated properly now that the carburetted water-gas plant is fast disappearing from the scene of its original labours—parts of it, in fact, have already been established in their more comfortable quarters at Foleshill.



PLAN OF THE COVENTRY CORPORATION GAS-WORKS AT FOLESHILL.

AREA OF THE MANUFACTURING STATION, 29·85 ACRES. AREA OF THE GASHOLDER STATIONS, 7·26 ACRES.

COAL GAS PLANT.

1 Retort-House.
2 Coal-Store.
3 Stokers' Mess-Room and Lavatories.
4 Condensers.
5 Coal-Hopper for Discharging Waggons.
6 Sunk Dock for Loading Coke.
7 Wharf for Loading Canal-Boats.
8 Exhauster and Engine House.
9 Boiler-House.
10 Washers and Scrubbers.
11 Purifiers.
12 Oxide Shed.
13 Meter-House.
14 Tar and Liquor Storage Tank (underground).
15 Tar and Liquor Pump-House, with Overhead Tar-Loading Tank.
16 Offices.
17 Workshops and Stores.
18 Locomotive Engine-Shed.
19 Pump-House and Water-Tower.
20 Sulphate of Ammonia Works.
21 Liquor Storage Tank.
22 Acid-Works.
23 Filter-Beds.
24 Culvert for Stream.
25 Weighbridge and Office.
26 Pipe Subway under Railway.
27 Valve-House.
28 Three-lift Telescopic Gasholder.
29 Residence for Gasholder Attendant.
30 Works Entrance.
31 Weigh and Time Office.
32 Engine and Blower House.
33 Governor House for District Governor.
34 Yard Mens' Canteen and Lavatories, with Service-Layers' Stores under.

WATER GAS PLANT.

A Generator-House.
B Coke-Store.
C Exhauster, Blower, and Engine House.
D Boiler-House.
E Pump-House, Lavatory, Photometer Room, and Over-head Water-Tank.
F Separators.
G Water-Cooling Tanks.
H Tar Storage and Loading Tanks.
J Relief Gasholder.
K Oil-Storage Tank.
L Purifiers.
M Meter-House.

The crowded state of the producing plant is only a representation of the condition of the whole of the rest of the works. As one place after the other is looked into, the same thing is found; and as the location of the outside plant is observed, and as it is noticed too how every available nook has been brought into use, one marvels how it has been possible to move about the works when, if ever such a thing occurred, there were at one time (say) 500 tons of coke stacked on the diminutive coke-grounds. It must have frequently been a serious problem for the Engineer as to where he was next to place an additional piece of plant or apparatus when his production demanded it. It is not intended

Tar and Liquor Tanks, showing Roofing Arches—May 2, 1905.

to describe the old plant in detail; but there are two or three other points to which attention may be drawn. It is noticed that it has not been the practice here to separately purify the water gas and the coal gas—in fact, had there been a desire to do so, we question whether ground space could have been found for the purpose. As it is, the water gas is drawn in at the foul main; and this method used to upset the purifiers very much when sulphur purification was in vogue. The purification plant consists of six boxes, 30 ft. by 25 ft., charged with oxide; and then for carbonic acid purification, there are three boxes, 40 ft. by 30 ft. for lime, and separated from these is a catch box, the same size. In the course of the perambulation of the works, housed in a place just sufficient to accommodate it, was seen a fan by Messrs. W. J. Jenkins and Co., of Retford, driven by a 23-horse power Crossley gas-engine. This little plant is used for driving gas from these works to the pair of new holders at Foleshill; and it will send through some 250,000 cubic feet of gas an hour against a 20-inch pressure. When the manufacturing works are finally dismantled, this plant, which has been found of the greatest service, will be removed to Foleshill, where it will perform a similar function by pumping gas from there to the gasholders at the Gas Street works, which will eventually be only a storage and distributing station, with accommodation for dealing with the work on the district. There are at Gas Street two holders, of a combined capacity of 1½ million cubic feet. The relief holder for the carburetted water gas is now being cut out and taken away. The ample provision that will in future be made for the district work will be welcomed in the department; for now with the expansion of that work, it is being carried on under what are, for such a large undertaking, extremely unpropitious circumstances. The fittings and lamp and meter and stoves shops are terribly confined; and in size look more like the rooms of cottages than workshops. Fifteen fitters are at work now; and how they are kept going is a matter not easy of explanation.

Following the transference of the manufacture to Foleshill, the fate of the old site has already been practically sealed. As has been intimated, the gasholders now standing will remain; and a goodly part of the interior portion of the site will be retained for workshops and stores for district purposes. This interior portion of the site will eventually be walled in; and as much as possible of the frontages will be sold for building cottage property.

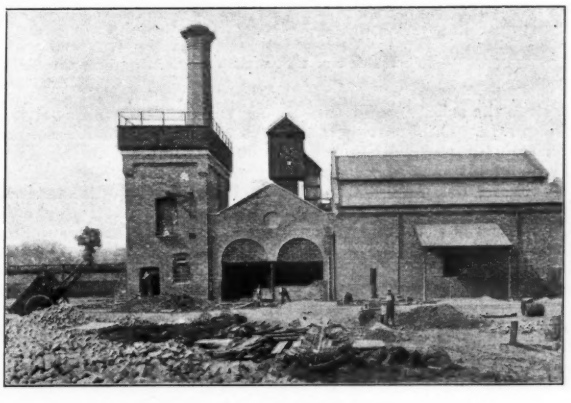
Let it not be thought, because we have written in a somewhat critical strain of the congested state of the works, that the Corporation Gas Committee have been going on heedless of the condition of the works, and of the future. Nothing of the kind. They have been well aware of all that has been written; and away back in Mr. Winstanley's time, they began the necessary remedial measures. There was only one possible course for them to take, and that was to go a distance outside the city, and on a fresh site commence an entirely new gas-works scheme. Some engineers will perhaps think that the Corporation deferred adopting this course a little too long in the interests of economical working. But that is a question of opinion that need not be discussed now; seeing that the Gas Committee have gone, and are going, to work under the advice of Mr. Stevenson, and with the sanction of the Corporation, with a breadth of view that will ensure the realization of the greatest possible economy in the future, by giving the fullest liberty to the manufacturing operations from the incoming of the coal to the outgoing of the gas and residuals. All this, of course, as has been seen, necessarily involves heavy capital expenditure; and, in addition to this expenditure (much of which will be earning nothing during the constructive period), it cannot be expected that the processes of manufacture will be immediately carried on in the same economical fashion that can be looked for when the working has comfortably settled down on to the new lines, and when the men have become accustomed to their new environment. Thereafter, working under the new conditions—if those conditions are accompanied by a sound financial policy tending to lighten as far as possible the burden of capital—both the department and the consumers must, the markets for materials being favourable, before long enjoy the benefits of the more economically produced commodity. Further than this, the removal of the manufacturing part of the works from the centre of such a city as Coventry is not without advantage to the ratepayers.

THE FOLESHILL SCHEME.

The New Site and the Plans for Development.

The site for the new gas-works at Foleshill is some three miles distant from the Gas Street works. The land was bought, an Act of Parliament obtained, and a scheme drawn up for what were called auxiliary works during Mr. Winstanley's engineership. Upon these auxiliary works, it was agreed to spend some £130,000. But nothing more than the purchase of the land, and the planning of the auxiliary works, was done prior to Mr. Stevenson's advent as Engineer some four years ago. As was only natural, when a new man came along who was to have the responsibility of carrying out the works and of their subsequent management and operation, it was found that his ideas and those of his predecessor as to what was best, did not altogether coincide. The chief difference was that Mr. Winstanley favoured inclined retorts and Mr. Stevenson has a decided preference for, and belief in the greater freedom of, horizontals. But Mr. Stevenson, after due consideration, also came to the conclusion that the best interests of Coventry would be served by discarding the manufacture of gas altogether at the Gas Street works, and concentrating the whole of the manufacture and all future storage at Foleshill; and that this could be done by exceeding by £50,000 the estimate of £130,000 for the auxiliary works—the new project contemplating immediate works of a capacity of 4¾ millions, with provision for extensions so as to allow of an ultimate capacity of 15 or 16 million cubic feet.

The Foleshill site is not an ideal one for a gas-works, though it may be, so far as we know, the best one reasonably available for the designed purpose. Regarding its characteristics, it is nearly 40 acres in extent; but it is not by any means a shapely piece of land—in fact, its irregularities defy the application of any ordinary term that would adequately describe it. We shall therefore leave the plan to graphically explain its outline. It has only a frontage of 120 feet for a main entrance on the Nuneaton Road. Continuing to the right hand, there is a frontage of about ½ mile on the Coventry Canal. Then across the site at the farther end of it runs the Coventry and Nuneaton branch of the London and North-Western Railway, severing the odd 7 acres or so from the main 30 acres. This 7 acres is at a higher level than any other part of the site. Then, on the farther side from the canal, part of the



East Front of the Sulphate Plant—May 9, 1905.

land juts out centrally from the main body of the site. Accompanying these drawbacks, too, were considerable variations in the levels—in one part of something like 22 feet; there being a very big dip in the centre. These differences necessitated, in levelling, the taking off and filling in of some 150,000 yards of spoil. There was, in fact, a great deal of heavy preparatory work to be performed, which, now that the site has been brought to something approaching uniformity of level, and some of the buildings have been erected, is apt to be lost sight of. However, looking at the plan, and considering these explanatory remarks, it must be conceded that the plotting out of large works—present and

prospective—on a site of such irregular configuration, has not been an easy task.

The scheme that Mr. Stevenson has evolved as the one calculated to make the best use of the site, is delineated on the plan; but we will lightly run over it before giving a few particulars covering the first section so far as its details have been developed. There is still certain plant reserved for the determination of type; and therefore this account will only be of a general character, as, on the completion of the scheme, the engineering features will, with the assistance of Mr. Stevenson, be dealt with more particularly in the "JOURNAL." The plans and drawings already seen promise that there will be considerable interest attaching to these subsequent articles. It may be conveniently mentioned here that Mr. Stevenson's son (Mr. F. H. Stevenson) is acting as Clerk of Works.

Immediately the works are entered, on the right-hand side is seen a group of buildings which will constitute the weigh-bridge office, a governor-room for dealing with the supply to the immediate district, and the fan and engine room, in which the plant already described in referring to the old works will be housed for sending the gas from Foleshill to the Gas Street holders. A 24-inch main has been laid to connect the two works. At the back of these is now being erected a building, 60 ft. by 20 ft., for a men's mess-room with a store-room below. The works being removed from the ordinary haunts of men, meals will be supplied to the men at a fixed tariff; and a committee of the men will themselves have a large voice in the management of the commissariat department. These buildings are all constructed of red brick, with blue brick bases; and a uniformity of architectural style—and a pleasing style, too—is being preserved throughout. Then on the opposite side of the entrance are the carburetted water-gas buildings, in which the plant from the old works is being erected in its improved state. The relief holder and all the necessary equipment are in the immediate neighbourhood. This end of the works is occupied exclusively (excepting the purifiers) by the carburetted water-gas plant; and it makes a very compact arrangement. The purifiers are adjacent to those for the coal gas. The next feature to be noticed is the well-finished main road, 40 feet wide, running from the main entrance right away to the railway sidings at the other end of the site. It is on the opposite side to the canal, and separates the part of the site devoted to production from the purification and other processes. The road has been sewered and the main pipes laid in it. On the large levelled part of the site between the canal and the main road, the plan provides for four retort-houses, of a capacity of 3½ millions apiece, with coal-stores. The disposition of these houses will give good latitude to the operations. The first house will be erected at the end of the site nearest the main entrance; but furthest from where the railway sidings start. There are two reasons for this—first, that this will enable the coke to be run out easily at the front, and, secondly, that the made-ground at the other end would have necessitated delay in putting in foundations; and the delay in erecting the other houses will allow of the consolidation of the made-ground. But Mr. Stevenson's opinion is that, in made-ground, the necessity for going deeper for foundations is not one that need cause any anxiety respecting expense, as pier and arch

Inside No. 1 Gasholder Tank: Showing the Brick Lining Wall and Part of the Dumpling—Oct. 29, 1903.

work to the solid ground can be carried out at a comparatively cheap rate. Only narrow coal-stores will be provided, adjoining the retort-houses, as Staffordshire coal stacks well in the open. The condensers will be situated alongside the coal-stores.

Crossing the main road, the next thing that claims attention is the strongly built retaining wall that has been constructed from the water-gas plant end round the corner of the land extending from the main part. This wall is at present of this shape ⌟; and it will in future be continued along the line of the site on the opposite side from the canal. Along the shorter, or south side, of this retaining-wall will be the Engineer's office, laboratory, &c.; so that the Engineer will be, as it were, almost in the middle of his works, instead of at the entrance, as is usually the case. This is following somewhat the plan of East Greenwich. Close to the Manager's office will be a range of workshops, stores, &c. A branch road will separate these buildings from those on the land opposite, which buildings will consist of the boiler, engine, and exhauster houses, &c., with ample accommodation reserved for extensions. Thus it will be remarked that the plan provides for the whole of the machinery being concentrated near the Engineer's office, and so will be constantly under his eyes. Beyond these last-mentioned buildings will be the scrubbers, washers, &c. Farther on will be the fine sets of purifiers, for the whole works; each set having its own meter-house. The purifiers for the first section are now nearing completion. A large tar and liquor tank is situated farther along; and provision is made for other tanks as required. Near by, in a corner, are the chemical works.

On the opposite side of the railway, on ground which is at something like 20 feet higher altitude than the rest of the site, are two four-lift gasholders, each of a capacity of 1¾ million cubic feet. Between the gasholder ground (for the intention is to use this 7 acres for nothing but storage) and the main site, a pipe-subway has been constructed under the railway; and a valve-house has been built, commodious enough for the valves of all future holders. A cottage is provided on the site for the gasholder caretaker.

A Few Descriptive Particulars of Buildings and Plant.

This explanation shows generally how the site has been laid out; and now, without going before the completion of the scheme into the engineering details, we will give briefly an outline of what has been done, and, so far as is known, what is proposed.

Railway Sidings.—There is a siding off the Coventry and Nuneaton branch line of the London and North-Western Railway Company, which was constructed by them especially for these works. From this the works' sidings make a complete circuit of the site—giving upwards of a mile of main sidings. From these, branch sidings are being made, and will be developed as work proceeds. Ultimately, for the first section only, there will be about 1½ miles of sidings. The branches from the main siding are, or will be, to the retort-houses, to the purifying-sheds, to the chemical works, to the carburetted water-gas plant, to the workshops, and to the coke-loading docks. The works already boast of a first locomotive; and a locomotive-shed has been built in a handy position to the workshops.

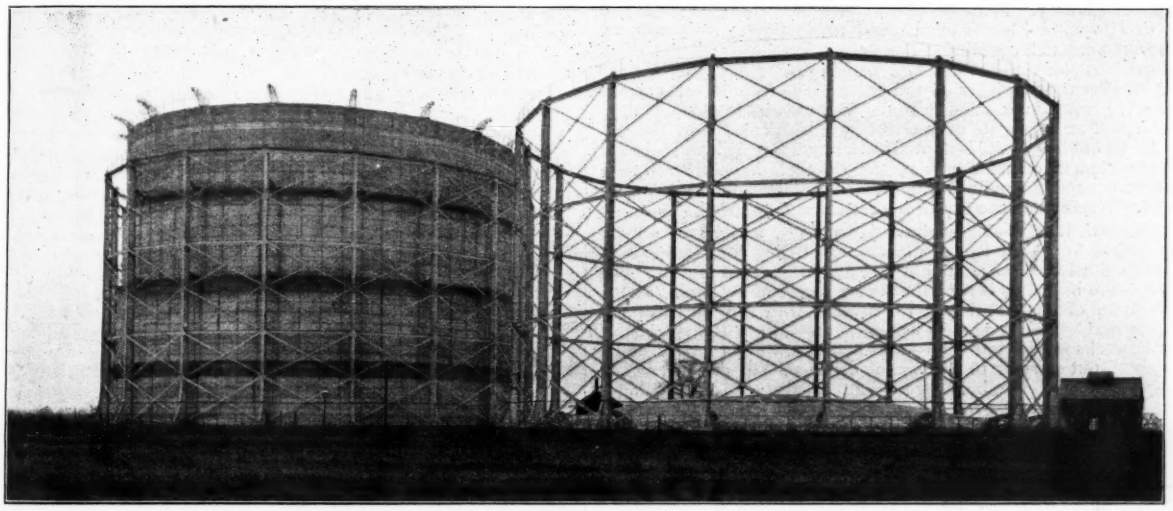
Retort-Houses.—The erection of the first retort-house—which, it has been mentioned, will have a capacity of 3½ millions—has not

yet been started; but it will be completed in time for next winter's season. It will have a total length of 240 feet, and be 128 feet wide. The central bay will be 48 feet wide and 70 feet high to the apex of the roof. The side bays will be of 40 feet span; but in height they will be from 20 to 30 feet lower than the central bay. It is to be a steel building, with galvanized iron roofs; so that only the two outside walls and the gable ends will be filled in with brickwork. There will be novelty about this house. The main standards will start from the basement, and will be carried up to the body part of the overhead coal-hoppers. They will be 21 feet apart, and will act as buckstays for every alternate retort-bed. Each upright will carry a main girder, 7 ft. 6 in. deep; and the central portion of the girder will be merely open lattice work. The part which will carry the coal-hoppers will be plate-web. The coal-hoppers, to contain 48 hours' supply, will be carried entirely by the girders; and, as a matter of fact, when the hoppers are completed, only the lattice part of the girders will be visible. It is proposed to feed the hoppers with gravity bucket conveyors. The stage-floors will be 10 ft. 9 in. from the ground-level. The floor in the central bay will be entirely devoted to the machinery for charging and discharging; the whole of the work being done from one side of the bench. The machine that will be adopted has not yet been finally determined upon; but it is apparent that there is a little bending of preference at the moment on the part of the Engineer towards a machine that will charge and discharge at one stroke. The side bays will be entirely for the retort-benches and coke-floors; and from the measurements given, it will be seen that Mr. Stevenson is going to provide generous working space for his men. The bench each side will consist of sixteen regenerative beds of eight 20 feet retorts, 22 in. by 16 in., ⏢ shape, which are expected to carry 7 cwt. charges. The house will therefore contain 256 through retorts. Central in the benches of retorts will be the chimneys. On the retorts being cleared, the coke will fall through openings in the outer stage-floors into hoppers below, where it will be quenched; and then, on the lower doors of the hoppers being opened, it will discharge into trucks underneath, which will be hauled by endless wire-rope driven by gas-engines. Outside the house, the trucks will run up an incline to an elevation not yet decided upon. This is practically the system in vogue at the Old Kent Road works of the South Metropolitan Company, and the one Mr. Stevenson had in use at the Grimesthorpe works at Sheffield. The result of this system of working he finds is good coke, and bright and clean, owing to the little knocking about that it receives.

Coal Store and Plant.—The coal-stores will be at one end of the retort-house. It is proposed, by hydraulic power, to end-tip the coal-trucks at the ground level at the end of the coal-store, discharging into a hopper to go through a breaker if necessary, and then into a gravity bucket conveyor of about 40 tons per hour capacity. This conveyor will pass over the coal-store (into which the coal can be tipped if not required for the hoppers), and onward to the retort-house, where it will travel, first, over one line of hoppers for feeding them; then, by passing it down (at the opposite end of the house) to the floor-level, it will be made to return over the second row of bunkers, so that the one continuous line of conveyor will feed the hoppers on both sides of the house.

Condensers.—These, as has been stated, will be situated at one end of the coal-store; but their type has not yet been determined.

Carburetted Water-Gas Plant.—Before passing to the other important sections of the works, reference should be made to the carburetted water-gas plant. In the early part of this article, when making a rapid survey of the features of the Gas Street works, it was mentioned that the carburetted water-gas plant was



The Foleshill Gasholders—May 3, 1906.

being removed from there and re-erected in improved form at the new works. In the old works, the generating plant found habitation in the inclined retort-house. In the new works, their housing is of a character befitting such an important contributor to the works' output; and, moreover, the arrangement of the plant will be such that it will give the best possible account of itself, and will assist in rendering to the mechanical part of the plant a fulness of life that could hardly be expected under the circumstances to which it was exposed at Gas Street. The range of buildings, built of red brick with blue brick bases, covers an area of 128 ft. by 43 ft.; and it is divided into generator, pump, boiler, and machinery houses. They are all large enough for duplicating the plant, which is at the present time fully capable of producing 1¼ million cubic feet. It is not proposed to work the plant in the summer time; and for the closing of the front of the boiler-house an innovation is found in the shape of roller shutters (raised and lowered by chains), such as are used in tram stations. The plant need not be described; the type and arrangement being so well known. Outside the buildings are seen two sunk circular water-tanks, built of brick. The water from the separator is going to be run to these tanks, the one tank being filled from the other; and then the water will be pumped and re-circulated for again washing the gas, after the Birmingham plan. Close by, is the relief holder, 60 ft. diameter, with two 20-feet deep lifts. Its storage capacity is about 200,000 cubic feet. An underground tar residuum tank (consisting of an old scrubber) has its position marked by a stand, on which will be elevated another tank from which trucks can be loaded. Near to these, a rectangular tank has been constructed of a size to take two oil-tanks. This is on the Liverpool plan; the intention being to save leaking oil getting away. Only one oil-tank is being put in at present. It is of 150,000 gallons capacity. A trench has also been constructed for the accommodation of the oil-pipes, so as to facilitate access.

Exhausters.—These will be of the Bryan Donkin Company's twin type, of 160,000 cubic feet per hour capacity, in duplicate.

Washer-Scrubbers.—These will be of the Holmes type, and of 4 million cubic feet capacity.

Purifiers.—The purifiers are at an interesting stage of their construction. The Horseley Company have now nearly completed their contract for the carburetted water-gas purifiers, consisting of six boxes, 30 ft. by 25 ft. Adjacent to these are an equal number of boxes (now under construction by the Whessoe Foundry Company) for coal-gas purification; four being 50 ft. by 30 ft., fitted with Jäger grids, and two (for lime), 60 ft. by 30 ft., fitted with ordinary grids. These boxes are intended for a production of 3¾ million cubic feet per day. The purifiers (which are simply built up on a slab of concrete) are going to stand in the open; sheds, 60 feet wide, between them being erected, within which to deal with the oxide and lime. This is somewhat after the plan adopted by Mr. Alfred Colson, of Leicester. The boxes are on the rubber-joint system. First-class rubber is being used, fixed by copper rivets; and the cost per box will only be about £4. Each box in the carburetted water-gas section has four covers, 12 ft. by 9 ft. 6 in.; and in the coal-gas section, the boxes will have the same size of covers, but there will be more of them. Bolts and nuts are the only fastenings used; Mr. Stevenson's view being that the price of patent fastenings does not warrant their use, as it is a simple matter for a man to "slip round" the boxes with a spanner, and loosen or tighten the nuts. The purifiers are to be worked in this rotation: In the case of the carburetted water gas, two boxes of oxide first, and then four boxes of lime. In the case of

the coal gas, just the reverse—that is to say, four boxes of oxide and two of lime. The lime is merely used for taking out the carbonic acid; nearly a third of the gas distributed being used for industrial purposes. There is accommodation for three more sections of purifiers when wanted.

Meter Houses and Meters.—The houses for the meters for the carburetted water gas and the first section of the coal-gas plant are now nearing completion. The meters are coming from the Gas Street works; and the makers Messrs. Parkinson and Cowan, are fitting new drums to them, in order to enlarge their capacity from 60,000 to 80,000 cubic feet per hour—making 160,000 cubic feet in all. This will save money.

Tar and Liquor Tanks.—Hereabouts one gets a good idea of the depth of the dip with which Mr. Stevenson had to deal in almost the very centre of the site. We have spoken of the heavy amount of levelling that has had to be done; but there would have been little use in levelling and then excavating again for the tar and liquor tanks. Mr. Stevenson has therefore made use of the low ground, by building the first tar and liquor tank (which is 100 ft. by 50 ft. by 15 ft. deep, and has a capacity of about 450,000 gallons) from the solid ground, and then filling up around it. The walls are constructed of concrete, and then asphalted. Another extensive space has been left unfilled, in readiness for the construction in a similar manner of the next tanks, without having to incur the expense of excavation.

Gasholders.—Crossing the railway line to the gasholder ground, the visitor is able to make a close examination of the two holders that have already been erected. They are excellent specimens of engineering work, and were built, to Mr. Stevenson's designs, by Messrs. C. & W. Walker. The tanks are constructed of concrete; concrete material being very cheap indeed here. The holders are each of 150 feet diameter, and of four lifts, 30 feet deep each—their capacity being 1¾ million cubic feet. One of the four lifts is made to rise beyond the framing, after the lead given by Sir George Livesey. Plate standards, and flat wind-ties back and front, also on the Livesey plan, have been adopted. A valve-house has been erected, containing the valves for the two holders and connections for three more; and a steam-boiler has also been put up here for use in winter for the prevention of the freezing of the cups. The land allocated to storage is sufficient to accommodate holders of an aggregate capacity of 15 million cubic feet.

As the holder ground is approached, another weigh-bridge house is observed in connection with the sidings. We have already marked one at the main entrance; and therefore no material can, or need, have entrance or exit here without being weighed.

Chemical Works.—These have been built, and have been in operation, for about twelve months; and they comprise a well-arranged sulphate of ammonia house and an acid works. The size of the buildings is such that extensions can be made, at the minimum of cost, sufficient for dealing with the whole of the liquor that will be produced when, in the future, the scheme of these works is consummated—that is to say, when they are equal to an output of 15 or 16 million cubic feet of gas per day. The arrangement of the buildings is one that commends itself for economical and really convenient working—whether manufacturing, storing, or despatch by rail—the railway waggons running right up to the side door of the store. It should be explained that at present the ammoniacal liquor is being pumped from the old works 3 miles away; and when these works are discontinued, the main that is now conveying the ammoniacal liquor will be utilized on the main road as a rider gas-main. It was laid under the footpath on the opposite side of the road to the main gas-pipe, with this ultimate change of use in view. The coming of the tramways has altered the department's practice respecting the laying of distribution pipes. The rule now is to place them under each footpath instead of in the roads, so as to facilitate connections and repair. But this only by the way. Returning to the sulphate of ammonia plant, it was supplied by Messrs. Goddard, Massey, and Warner. It has an ordinary open fishing saturator, and a capacity for 60 tons of liqour in the twenty-four hours. Turning to the sulphuric acid plant, the building has a capacity for apparatus equal to double or treble the present requirements. It is a very compact plant, and is about the smallest we know of in connection with gas-works, unless, perhaps, that at Carlisle displaces it in this respect. The capacity of the plant is about one-and-a-half times that of the present sulphate of ammonia plant. In proximity to the chemical works is a filter for dealing with the surface water.

We have now come to the end of this sketch of the old and the new works of the Coventry Corporation Gas Department. Henceforth it will be the new works that will only hold real interest for gas engineers. Looking at what has been said in the course of this article, though considerable expense has had to be incurred in levelling the site, the new works are going to be an example of gas-works construction in which cheapness will be combined with excellence. Much work, such as the construction of the railways, the sewerage system, and the laying of pipes on piers, has been done by the department's own men. Furthermore, the Foleshill works have only to be set in comparison with the cramped and retarding conditions under which operations were carried out at the old works, to give the assurance that at the new ones the processes will be conducted cheaply. And as the business of the department progresses, as it is bound to progress, the prevision that is seen everywhere on the site at Foleshill will ensure extensions being made at the lowest possible capital cost. To the gas engineer, interest abounds in them; and we have no doubt that the more complete and detailed publication that will be made when the first section of the works is finished will be highly acceptable to all who, being engineers in the true sense of the word, find interest in not only their own, but in the work of their professional brethren.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Bolton Gas-Works.

On Saturday, the members of the Association paid a visit to the Bolton Corporation Gas-Works. There was a fair attendance. The party were met at the works by Mr. A. E. Saville, the Superintendent.

The first place visited was the retort-house, which contains sixteen beds of eight retorts, all horizontal, fed by Arrol-Foulis hydraulic machinery, by which they are charged and drawn at the rate of one per minute. The furnaces are Drakes'; and the coke is carried away by manual lubour. Outside the retort-house are two overhead coal-bunkers, of 50 tons capacity, for loading into carts. The works have their own private siding in close proximity to the railway; but the coal has to be carted into the retort-house.

The exhauster-house was next visited. The exhausters are of Messrs. G. Waller and Son's make. Messrs. Dempster's tar-separators are in use; and all the tar is conveyed to the other works by gravitation. The Mann and Walker tower scrubbers, the two station-meters (Braddock's) and the district governors, by Cowan, were next inspected. There are six purifiers, each 22 feet square, of which three are used and the others held in reserve. There are four gasholders, of a total capacity of 6 million cubic feet, three of 1¼ millions, and one of 2¼ millions.

The weather conditions being unfavourable, it was decided not to visit the works in another part of the town.

Mr. H. Smith, in proposing a vote of thanks to Mr. William Smith, the Corporation Gas Engineer and Manager, Mr. Saville, and their assistants, said that he was sure the members were all grateful to them for their kindness in conducting the party over the works, the inspection of which had been very interesting and profitable. Mr. Davies seconded the proposition. The vote of thanks was unanimously accorded, and the members dispersed.

Midland Association of Gas Managers.—The Hon. Secretary (Mr. C. Meiklejohn) intimates that the spring general meeting of the Association will be held at Coventry on Thursday of next week, the 17th inst.

British Association of Water-Works Engineers.—We have received from the Secretary (Mr. Percy Griffith, M.Inst.C.E., F.G.S.) the Transactions of the Association for the past year. They comprise the papers read at the summer and winter meetings, held under the presidency of Mr. P. H. Palmer, M.Inst.C.E., the Borough Engineer of Hastings, with the discussions thereon, which were duly noticed in our columns at the time. They are fully illustrated, and constitute valuable additions to the literature bearing upon water supply. The contents of the book include the rules, lists of Council and officers, and a useful index to the whole of the Association's proceedings, of which the present is the tenth volume. It has been produced under the editorship of the Secretary, and has as a frontispiece a portrait of the President.

The Earthquake at San Francisco.—In the article on this subject which appeared in the "JOURNAL" a fortnight ago (p. 229), it was stated, on the authority of the reports which appeared in the daily papers, that the gas-works, situated to the south of Market Street, San Francisco, had been destroyed. The last number to hand of the "American Gaslight Journal" contains a statement to the effect that dispatches dated the 20th of April which reached the office of that publication from Oakland, declared that "all the stations of the San Francisco Gas and Electric Light Company have been destroyed." This seemed to our contemporary to be an exaggeration, "for the main electric station looks to have been impregnable." The Editor adds: "Let us hope that the news is false." Later accounts are to the effect that the electric lighting, at all events, has been restored.

Transactions of the American Gaslight Association.—We have received the "Transactions" of this Association for the past year. It contains the papers read at the 33rd annual meeting, held at Milwaukee from the 18th to the 20th of October, under the presidency of Mr. E. G. Cowdery, of St. Louis (Mo.), with the discussions thereon, and includes the seventh annual report of the Trustees of the Gas Educational Fund, with the answers to the third series of questions sent out to the practical class. In an appendix are given reports by the Research Committee on proposed standards for cast-iron pipes and specials and on the effect of humidity on pentane lamps; a review of current gas literature and new publications; a list of patents issued and expired from Oct. 1, 1904, to Oct. 1, 1905; notices of deceased members; lists of officers and members; and other matter relating to the Association.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Annual Meeting at Newport.

The First Annual Meeting of the Institution was held at the King's Head Hotel, Newport, last Wednesday. In the unavoidable absence of the President, Alderman Thomas Canning, J.P., Assoc.M.Inst.C.E., of Newport, who was detained in London on parliamentary business, the chair was taken by Mr. EDWARD JONES, of Burslem (late of Pontypridd). Among those present was Mr. F. W. Cross, of Lea Bridge, President of the Southern District Association of Gas Engineers and Managers.

The CHAIRMAN, in opening the proceedings, expressed regret at the absence of their President, who he said had looked forward to the meeting, and had written a paper for it. Mr. Browning, of Neath, the President-Elect, was also unable to attend, owing to the serious illness of a relative. The absence of the President would be especially felt, as it would take away a good deal of the strong personality of which he had shown himself possessed from time to time. Probably there never was an occasion when they required his careful guidance and ability more than at this initiatory stage of the existence of the Institution. He (the Chairman) had had to take his position quite unprepared; but he hoped all present would help him in making the proceedings in every way successful.

REPORT AND ACCOUNTS.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) then read the annual report, which showed that during the past year 46 engineers and assistants had joined the Institution. The total receipts had been £23 12s. 6d., and the expenditure £21 11s. 6d.; leaving a balance in hand of £2 1s. After reference to the last meeting of the Institution, the report stated that a copy of the "Reports of the District Gas Associations," which included that of South Wales, had been sent to each member free of cost; and the Council hoped that the members had found the volume of service.

The report and accounts were adopted *nem. con.*

ELECTION OF OFFICE-BEARERS.

The CHAIRMAN moved the election of Mr. R. A. Browning as President for the ensuing year. He thought that all would agree with him that the success and prosperity of the Institution would be in safe keeping in his hands.

Mr. J. M. SMALL (Merthyr Vale) seconded the motion; and it was carried by acclamation.

On the motion of Mr. OCTAVIUS THOMAS, Mr. Edward Jones was elected Senior Vice-President; and on the motion of the CHAIRMAN, Mr. T. Acland (Llanelly) was chosen Junior Vice-President.

Messrs. G. T. Andrews (Swansea) and J. H. Canning (Newport) were elected members of the Council, to replace those who had retired. Mr. Henry Morley (Cardiff) was re-elected Hon. Treasurer; Mr. Octavius Thomas, Hon. Secretary; and Messrs. J. C. Pennington (Colwyn) and S. J. Acland (Blaina), Auditors.

NEW MEMBER.

Mr. J. Wadkin Wynne, the Manager of the Sharpness Docks Gas-Works, was duly elected a member of the Association.

PROPOSED AFFILIATION WITH THE INSTITUTION OF GAS ENGINEERS.

A notice of motion by Mr. Octavius Thomas was on the *agenda* as to affiliation with the Institution of Gas Engineers.

Mr. THOMAS stated that when he brought this matter forward last year he had not studied the finances as much as he had done since; and he thought they ought to leave the question for the present.

The CHAIRMAN said that while the Council desired to keep going, and in perfect working order, they did not wish in any way to injure the Institution by going too far; so that, if he had the instructions of the meeting, they proposed to defer the matter to another year.

Replying to a question as to what effect it would have on the election of new members,

Mr. THOMAS said that if the Welsh Institution affiliated, any of the members eligible for membership in the Institution of Gas Engineers would be admitted free of entrance fee.

It was resolved to defer the matter for another year.

Papers and Discussions.

Mr. J. H. CANNING then read the paper written by his father (for whose absence he apologized), on

THE DURABILITY AND ILLUMINATING VALUE OF THE INCANDESCENT MANTLE.

The value of gas lighting is the result obtained by combustion on the consumers' premises. If this result is not good, it matters little what the process of manufacture is. After being mixed with air in a good burner, and set alight so as to render a mantle of the well-known type incandescent, the gas has completed its life, and the mantle takes up the work of illumination. This shows at once how important it is that the mantle should be studied. We transfer all our work, and all lighting interest, to it. The consumer requires cheapness, durability, and high illuminating power in a mantle. Sometimes he obtains his mantle from the gas authority, who also adjust it for him, watch it, and renew it when worn out or broken. Sometimes he buys it in the open market; adjusts it himself; lets it go its own way; and forgets to renew it so long as there is a glimmer of life or light left in it. Neither the consumer nor the mantle should be left unguided to go its own way. The proper thing for all consumers to do is to contract with the gas authority for the maintenance of the mantles if they wish to secure what they desire.

But my object now is not to point out so elementary a truth as this. I deem it a matter of greater importance that research should show us what a good mantle is; that a series of trials should determine for us something more exact than our present knowledge extends to, of the durability and lighting value of the various mantles now in the market. And yet more than that—I suggest that the trials should become regular and continuous, so that by this means makers of mantles may be stimulated to supply their better qualities only, and keep on improving them until the imitation mantle shall cease to exist.

So great an industry as ours should not be at the mercy of every charlatan who knows little of chemistry, and nothing of the decalogue, to rend and ruin it as he likes, now that the incandescent mantle is the highest expression of the power and softness of artificial lighting. It is singular—yet true—that some of the mantles made of the best material fail in durability. Some research is required into the cause of this, and some discrimination is needed so as to distinguish between a really bad mantle and one that is serviceable.

Recently some tests were made at the Newport Gas-Works of mantles the most commonly used. The tests were of two kinds. First of all there was a duration test—that is to say, the burner was lighted day and night, and the mantles exposed at all times to the heat of combustion of very powerful bunsen burners. There seems to be no end to the power of resistance of the rare earths, if only the combustion is maintained continuous and regular. The second test, however, was of another kind. In this test the mantles were subjected to what may be called ordinary treatment in everyday work; they were turned on and off.

In carrying out the test, it was determined first of all that one type of burner only should be used; and the one selected was the "C" burner consuming 4 cubic feet of gas per hour. The gas was consumed in the burner at this rate per hour, and under a pressure of 3½ inches. The standard with which the burner was compared and the illuminating power of the mantles ascertained, was the 10-candle pentane standard. The following mantles were tried:—

No. 1. Three-ply silk.
„ 2. Three-ply cotton.
„ 3. Mantle described as the "best in the market," and the dearest.
„ 4. A single-woven silk mantle.
„ 5. Cheap 3d. mantle.
„ 6. A cheap mantle sold at 2¾d., and labelled "Made in Germany."
„ 7. A mantle sold at 2½d., not made in Germany, but an English adulterated article.
„ 8. A silk mantle.
„ 9. Single-woven cotton mantle.
„ 10. Double-woven silk mantle.

For the present, I can only say that the investigation of the mantle itself offers too many problems to be determined in the course of one paper. I think it will be wiser to reserve judgment, and print simply the results as they were obtained.

I exhibit diagrams [see p. 370] which were taken; but I do not offer them as conclusive. They do, however, show some very extraordinary and unexpected results. For example, there is not anybody who would imagine that his ordinary mantle lighted in his sitting-room was giving 120-candle power, and yet this is a fact. It is perfectly true that this power goes down; it is perfectly certain that the best mantle starting at 120-candle power very quickly becomes 80-candle power. But, as you will observe at once, there is nothing for us to be alarmed about in this, It is an extraordinary illuminating power to be obtained from 4 cubic feet of gas—it means 30 candles per cubic foot per hour.

It will be necessary, there is no doubt, some time later on, to develop more fully the diagrams presented here to-day; and also it is hoped that others will now start independent observations of their own.

There were really only two bad mantles among the ten. They are both popular mantles, bought by people when left to themselves. The one "Made in Germany" has a diagram of its own so telling against it that I do not feel inclined to say a word in condemnation of it; but it is not nearly so bad as No. 7. This mantle was not "Made in Germany;" but, on the contrary, its denomination showed that it was "Made in England." It is sold cheaply and bought largely. The result of it in working is that it

breaks and destroys the chimneys. One of these mantles, costing 2½d., did during its precious career destroy four chimneys costing about 3d. each. Yet people will buy them. I am going, however, further into this matter on another occasion. For the present, I cannot say much more, and am content to leave the matter where it is—only adding that there is no adulteration like English adulteration.

It is perfectly true that the German mantle is a very bad one, but it is not the equal of the English one for pure rascality. Not only was the material of the latter mantle adulterated, but examination showed that even the important chemical that was employed to make the adulteration was itself adulterated.

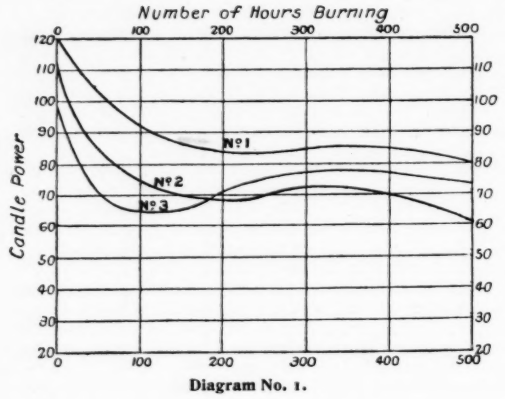


Diagram No. 1.

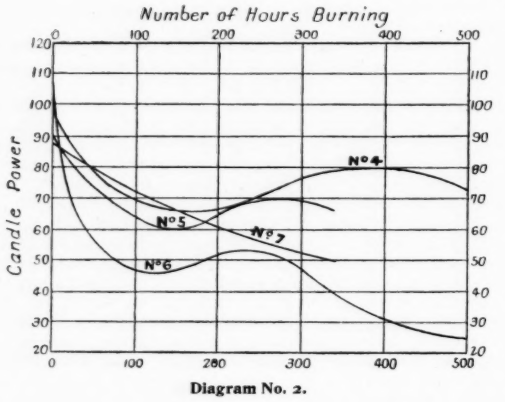


Diagram No. 2.

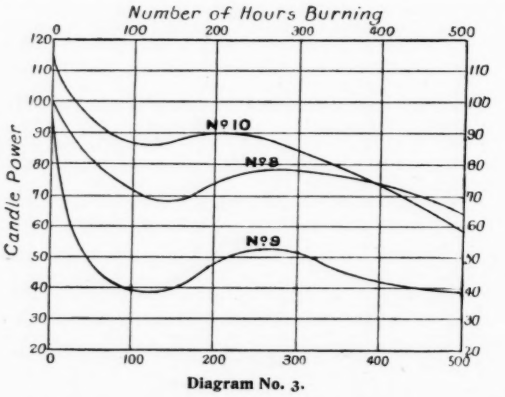


Diagram No. 3.

The conclusion which I come to is this—for the present at all events—that all persons connected with the supply of gas must scrutinize and study the gas-mantle day by day; and also I think they ought not to allow a single one to pass out to the public unless it has been properly made by, so far as they can ascertain, competent people. I hope one day to return to the subject which I am now introducing, as I think it is of great importance.

I append a few notes of the condition of the various mantles at the end of the test:—

No. 1. In almost perfect condition; very little shrinking.
„ 2. Small hole in side; centre shrunken.
„ 3. Slight shrinkage and broken round base.
„ 4. Condition perfect; slight shrinkage.
„ 5. Collapsed.
„ 6. Very badly broken near base and shrunken; nearly useless.
„ 7. Collapsed after breaking four chimneys.
„ 8. Good condition; fractures near base; slight shrinkage.
No. 9. Very badly shrunken in circumference and length; but in good condition, and capable of yielding a fair light with reduced gas supply.
„ 10. Fair condition; badly split near base; slight shrinkage.

Upon the whole, it will be seen that there is no possible lighting factor as yet discovered in the world that can give the same high illuminating results as rare earths in the incandescent mantle. There is a great power there; but it is a power which the gas world will have to use with intelligence and science. We have not yet learned the immense power that is placed in our hands, nor have we arrived at the best way of developing it. This little attempt of mine is only a beginning; and I do not put it forward as the last word upon the subject.

Before closing, I must say that in this investigation I have to make my acknowledgments to Mr. Joseph Herbert Canning, who carried out the experiments which are illustrated in the diagrams accompanying the paper.

Discussion.

The Chairman said he was sure they would all agree that they had listened to a very interesting paper, and one in which there was a great amount of scope for discussion. No doubt all of them had experienced some of the difficulties pointed out in the paper; but not all of them had had the time or the opportunity to go into them so thoroughly as the President had been able to. He could not do better than refer them especially to Alderman Canning's remark, "there is a great power there; but it is a power which the gas world will have to use with intelligence and science. We have not yet learned the immense power that is placed in our hands, nor have we arrived at the best way of developing it."

Mr. G. Mayne (Penrhiwceiber) asked how it was that in some of the tests the illuminating power had dropped, but had risen again.

Mr. T. Acland (Llanelly) said he was sure they all felt very grateful to the President for his able, interesting, and instructive paper, which touched a most important question in connection with modern gas lighting. As regarded the subject-matter of the paper, it had a short history; but there was a lot of mystery round it. For some months past he had been considering it, principally because it seriously affected the making and output of gas. He had learned a great deal that morning as to the loss of illuminating power. He had found that unless the mantle were so held as to allow a quarter-of-an-inch of it to hang over the burner, it would begin to swing about; and after the mantle had been in use a short time, this would tend to destruction. He had also found that some of the higher-priced mantles did not last as long as the cheaper ones. This seemed very extraordinary. The question of the consumers having to keep their mantles in order was a matter which affected gas companies. He had persuaded his Company to start a show-room; and he intended to keep a man to go round and change mantles, &c., for consumers, because he was sure that when mantles were out of order they not only gave an indifferent light, but also represented a loss of gas consumption. He had found that the more uniform the pres sure they could apply to the mantle, the greater chance they gave it. It was the intermittent, the constantly changing, pressure which was destructive to mantles, as regarded their lifetime. Again, they wanted an increased pressure for use with the incandescent system, as compared with what was required for the old flat-flame. For the latter, it was 12-10ths or 15-10ths; but from 18-10ths to 20-10ths was necessary for proper lighting with incandescent burners. He hoped the time was drawing near when they would be able to get a good mantle for 1d. There could be no doubt that incandescent lighting had come to stay; and he agreed with the President's remarks that they must increase their knowledge in the direction of the application and use of the incandescent mantle for general purposes, and try individually to find the best conditions under which it could be applied, and to instruct the consumer accordingly. He must say the paper was a very valuable contribution to the proceedings of the Institution, and one which he had not the slightest doubt would be the means of making every gas engineer think much for himself.

Mr. J. M. Small (Merthyr Vale) said he would like to know the names of the mantles to which the various tests had been applied; and also whether the trials were carried out in connection with public or private lighting.

Mr. F. W. Cross (Lea Bridge), who rose in response to the request of the Chairman, thanked the members for inviting him to join them that day, and said he was only sorry he had not been able to attend the first meeting. As one formerly with Alderman Canning at Newport, it was a great pleasure to him to come and support his old chief; and it was interesting to know that, while he was President of the Welsh Institution, he (the speaker) occupied a similar position in the Southern District Gas Association. It was also a pleasure to hear the paper read so well as it had been by Mr. J. H. Canning, who more than twenty years before used to skip in and out of his office while he (the speaker) was working there. As to the paper, the question of incandescent lighting was of great importance to all of them. The *crux* of the whole matter had been well put by Alderman Canning, when he said "the proper thing for all consumers to do is to contract with the gas authority for the maintenance of the mantles if they wish to secure what they desire." In his district, they had a very large number of burners under maintenance, and a staff of men to

deal with them. When a traveller came to him with a special mantle, he asked for a gross, and then he handed them over to the maintenance man. If they would not stand the test of maintenance, then the mantle was rejected. But he thought that they should all endeavour to foster the maintenance business to the utmost extent. They had special maintenance men, and one especially, who worked on a salary or wages and commission, and went round and picked up fresh customers wherever he could. The only way to foster the incandescent business properly was to get the maintenance, because this meant the use of a good mantle. Having decided by experiment upon a good mantle, let them put it as it were on the market of their town, and it would become known by its name, and people would get to know that the Company supplied it, and they would then ask for it. They had many shopkeepers in the district with which he was connected; but the name of the mantle that they supplied had become proverbial, and people asked for it. This showed how they could foster a better kind of mantle, which would answer all practical purposes. The question of the burner that was used for making tests was rather an important one; for, as they knew, there were burners and burners. He noticed that Alderman Canning obtained from his burner originally 120 candles; and in one or two cases he was very near that. Now it must be a remarkably good burner to yield such a result as this, and also a remarkably good mantle; for he had found that if he could get (say) 90 or 100 candle power to start with on a burner, it was very good—he meant with the 30s. or 36s. a gross mantles. He thought 90 candles a very good efficiency. In his experiments, he had two burners out of stock; and he took what he considered would be the inferior one, and tried the mantle on it. The result, shortly stated, was 70 candles. Then he transferred the mantle very carefully to the other burner, and obtained over 90 candles. If they could get these two results from the same mantle, it showed that, though there might be something in the mantle, there was also something in the burner. He was very pleased to see that Alderman Canning had alluded to the cheap German and cheap-and-nasty English mantles, because they heard a lot about the mantle made in Germany as being very inferior. At the same time, there were some very good mantles made in Germany; and he was not one to say that they should not be used in England. The invention originally came from Germany; and it was for our English makers to say that they could supply as good mantles as were furnished from Germany, and as cheap. They could get good English mantles at a cheap rate; but he thought a great mistake was made by gas companies purchasing and trying to use these very cheap mantles. Mantles of 26s. or 28s. a gross proved the best for maintenance. For selling they must have better class mantles. [Mr. Cross showed one or two interesting experiments with improved mantles such as those that were referred to in the "JOURNAL" for April 17, p. 169.]

The CHAIRMAN expressed the indebtedness of the meeting to Mr. Cross.

The HON. SECRETARY (Mr. Octavius Thomas) asked if Alderman Canning had any special reason for making his tests under a pressure of 3½ inches.

Mr. CROSS, in some further remarks, referred to the danger of mantles breaking off at the neck, and said this was often due to the fact of it being collodionized. A sticky substance sometimes exuded from the mantle, and then at times the mantle would stick. They might be sure when this happened that the mantle would go immediately there was any shrinkage.

The CHAIRMAN said he thought they had had a very good discussion, and one that would provide plenty of food for future thought. They must all have had experience of these mantles. He agreed with the author of the paper as to the importance of the maintenance system, as by it they had the opportunity of correcting people's ideas with regard to the burners, which were very often not attended to or cleaned as they should be. He was sorry that more was not said in the paper as to the inverted mantle. In the town to which he had recently removed, the upright mantle seemed to have gone almost out of date. The results of the tests, as set forth on the diagram and in the paper, were very startling. They all admitted that high pressure at the burner was of importance with regard to incandescent lighting. The great failure was where they got down to a method of distributing at 10-10ths to 15-10ths. They had all very much appreciated Mr. Cross's remarks and experiments.

Mr. C. WHITE (Blaenavon) asked what gas was used in the experiments—coal gas or a mixture with water gas?

A MEMBER asked what kind of mantle was used for street lighting in Newport.

Mr. CANNING, in reply, thanked the members for the interest they had taken in the paper. With regard to Mr. Mayne's question, as to the fall and then subsequent rise in the curve representing the light given over a period of 500 hours, this was a question the answer to which had not been yet ascertained. The only suggestion that he could make was that it was due to the contraction of the mantle after a certain number of hours, the result to which might probably be to bring that portion of the mantle into a hotter zone of the flame. Mr. Acland had spoken of the importance of uniformity of pressure. He agreed, and said that a variation of a tenth in pressure made all the difference between a bad and a good illuminant. He trusted also that the mantles at one penny would be better than Nos. 5 and 7 in the tests. Mr. Small had asked him for the name and kind of mantles used in the tests. He was sorry he could not give information on this matter, as it would be rather invidious to touch upon. Another member had asked if they were used in public or private lighting. All, with the exception of No. 8, were used in private lighting. He agreed with Mr. Cross that the only test for mantles was by bulk and by maintenance. Shopkeepers, he feared, sold those mantles which enabled them to secure the biggest trade discount. Someone told him he had bought a box of a dozen at 2¾d. each, and only three of them were of any use at all—the others all breaking when placed upon the burner. He and his father had both been greatly amazed themselves at the results of the experiments they had made. One burner was used for all these experiments. If they tested one side of a mantle and then the other, they would find a great difference—in fact, he believed that no two portions of a mantle would give exactly similar results. Another member had asked what type of chimney they had used. It was the short Jena chimney. Dust accumulating was the cause of more deterioration in the illuminant than anything else. If only people would clean more, they would find a remarkable and an immediate improvement in the illuminating power. Mr. White had asked what gas was used; it was a mixture of coal gas with about 20 per cent. of water gas, and was constant throughout.

Mr. OCTAVIUS THOMAS then read a paper entitled

A FEW NOTES ABOUT GAS-MAINS.

The district of gas supply over which I have control comprises the greater part of the two Rhondda Valleys, and covers an area of nearly 20,000 acres and a population of 100,000 persons. It extends from Trehafod right through the Rhondda Fawr Valley (or large valley) and as far as Tylorstown, in the Rhondda Fach Valley (or small valley). The lowest point supplied is 270 feet, and the highest over 1000 feet, above Ordnance Datum. The Rhondda Fawr Valley is 11½ miles in length, and the Rhondda Fach Valley, in my district, is 2½ miles long. Houses are built on practically the whole length of the main roads through the valleys, with small towns or villages here and there—the number of different places supplied being twenty-three. The district is supplied from two gas-works—one situated at Porth (300 feet above Ordnance Datum), which is at the lower end of the large valley, and the other at Ystrad (480 feet above Ordnance Datum), in the middle of the Rhondda Fawr Valley, and about 5½ miles from the Porth works. The consumption of gas in the past eight years has increased from 74 million cubic feet per annum to 160 million cubic feet; the quantity produced at the Porth works being about 10 per cent. more than at the Ystrad works. Gas-mains are laid along the main roads the whole length of each valley; the total length being 45 miles, varying in size from 15 inches to 2 inches in diameter.

In obtaining such an increased consumption of gas, an extension of the manufacturing plant and storage has been necessary. In 1900, the supply of gas to one part of my district, situated about 3 miles above the Porth works and 2½ miles below the Ystrad works, became very deficient; and the question of increasing the size of the trunk mains had to be taken in hand—additional gasholder storage being required at the same time. Not having any room for a gasholder at the Porth works, and the works being surrounded by houses, I went into the question of erecting a gasholder in the middle of this district, and so saving the expense of laying larger mains; the intention being to pump gas from the existing mains into the holder during the day, by means of a gas-engine and exhauster, and return it into the same mains through a governor during lighting time, as required.

At this time the consumption of gas was increasing rapidly; and in dealing with this matter I made due provision for the large increase which has occurred, as shown by the figures already given to you. I estimated that the cost of this main would be £6000; and the annual interest and repayment of the loan, if borrowed at 3¾ per cent. for a period of thirty years (which is the usual time allowed by the Local Government Board), would be £336. There would also be the additional annual cost of repairs to the larger mains from subsidence, &c. Against this the cost of a governor, exhauster, and house, with the necessary connections, amounted to £650. The annual interest and repayment of this loan is £36; and the cost of gas, labour, pumping, and attending to the governor amounts to £100 per annum, making a total of £136. I have not taken into consideration the cost of the land and gasholder, as this would be the same in either case. After duly considering the matter, I decided to erect the gasholder in the district and not lay any larger mains; and it has worked most satisfactorily. I have a bye-pass with governor attached to the exhauster, as my supply for filling the gasholder is taken from a live-main. By these means, I always maintain a minimum pressure of 15-10ths in the district during the period of pumping, and have no difficulty in giving a full supply to gas-engines working in the locality and other consumers at the same time.

The celebrated Rhondda steam coal being worked under the whole of this district, the leakage of gas from mains and service-pipes, and the necessary repairs, are serious items in the revenue account every year. You will be surprised to learn that during twelve months I have repaired no less than 1500 leaky joints and broken mains. In some places in the district, I find the mains are drawn apart. In one instance I found a service-pipe to a

street-lamp drawn apart no less than 9 inches; but fortunately this was in a clay soil, and the gas passed through the opening left where the gas-pipe had been. In other places I find the mains squeezed together, until eventually the socket becomes smashed, and then the pipe is able to move forward. In one instance of this sort I had a 6-inch main smashed, and the spigot end of the pipe was found 4½ inches beyond the end of the socket after the fracture. I have fixed expansion joints on the sides of the hills, which help the main to give a little; but, in spite of this, I am continually repairing leaky joints between them. When it is realized that millions of tons of coal, &c., are taken out of the valley yearly, and that the whole of one part of my district has dropped 5 feet in the past twenty years, it will be seen one must have anxious times.

The Editor of the "Gas World" in September last year asked, "What is a main?" in reference to the calculations made as to the number of consumers per mile of main, &c. My definition of a main is: A pipe laid in, and running parallel to, any road from which branch pipes are taken off to supply consumers or street-lamps—these being called service-pipes. In estimating the consumption per mile of main, &c., I consider that all pipes coming under this description, even if only 1 inch in diameter, should be included in the length. I have had this question before me on several occasions in connection with a demand for a supply of gas from private consumers and local authorities. The Gas-Works Clauses Act, 1871, being incorporated in every gas company's Act of Parliament, the right of demanding a supply of gas by owners and occupiers of premises is governed by section 11 of the Act, which reads as follows: "The undertakers shall, upon being required so to do by the owner or occupier of any premises situate within 25 yards from any main of the undertakers, or such other distance as may be prescribed, give and continue to give a supply of gas for such premises," &c. As no other distance is usually prescribed, it may be taken in this case that the gas company is bound to supply within the 25 yards. The right of demanding a supply of gas by local authorities is governed by section 24 of the same Act, which is as follows: "The undertakers shall supply gas to any public lamps within the distance of 50 yards from any main of undertakers in such quantities as the local authority of each district, or the trustees of any turnpike road or any highway board within the limits of the Special Act, may from time to time require to be supplied," &c.

Under each of the above sections the question to be decided is, "What is a main?" Let me give an example of what I mean. A main was laid to a certain point in a road, and a street-lamp fixed at that point. The local authority decided to erect lamps beyond, and submitted a plan showing ten lamps required at a distance of 80 yards apart. The gas company declined to lay the necessary main, stating that the revenue was not sufficient to pay interest on the outlay. Later the local authority submitted another plan showing the lamps 50 yards apart. The gas company were then obliged to lay the main under section 24 of the Gas-Works Clauses Act, 1871. The size of the main has to be settled by the manager of the gas company; and assuming that in this case he decided to lay a 1-inch pipe to the last two lamps, then I submit this would still be a main, and the local authority could demand a supply of gas for a lamp or lamps beyond, provided they were not more than 50 yards apart.

Discussion.

The CHAIRMAN said that the paper read to them by their Hon. Secretary bristled with points of much interest. He had his (the speaker's) deepest sympathy in the matter of breakages and leakages in pipes. In time past he had had much the same experience and anxiety that Mr. Thomas still had. He had known what it was to have to keep gangs of men repairing, and had seen pipes broken so that they were almost at an angle of 45 degrees.

Mr. T. ACLAND (Llanelly) said that undoubtedly the question of mains was one of great importance to gas managers. He had had four districts in South Wales in his charge at different times. One of them when he went there had a leakage account of 43 per cent., another of 28 per cent., another of 20 per cent., and a fourth one of 24 per cent.; so that he, too, could fully sympathize with all that Mr. Thomas had said. He did not know, under the circumstances, whether Mannesmann steel tubes might not be useful in certain cases. He could not yet speak from personal experience; but he had within the past fortnight prepared a scheme, in which he allowed his Directors to determine whether or not they would put in 4½ miles of steel tubing in preference to cast iron. With regard to Mr. Thomas's remarks in the latter part of his paper, undoubtedly a main was a main as long as it was parallel to the road, so long as there were branch pipes from it, irrespective of its size. He was once called upon to replace some five miles of wrought-iron pipes. He found that a great part of the leakage was due to having these pipes, and by removing them the leakage was reduced from 24 per cent. to 16 per cent. He expressed his agreement with Mr. Thomas's interpretation of the Act of 1871 regarding public lighting. Dealing with the question of wrought-iron and cast-iron pipes, he said they must take into consideration the greater lifetime of cast iron as compared with wrought iron. In the first they had a matter of 50 years, as against 12 or 15 years with wrought iron. In the last 20 years, the condition of gas supply had altered very much—since the introduction of gas-engines, incandescent lighting, &c. Where 4-inch pipes were ample, they must now be 6 inches; and where 3-inch would do before, they must now be 4-inch or 5-inch. This affected gas companies very materially in one way, as it increased the cost of distribution.

Mr. CANNING expressed the view that in districts where subsidences were extreme the substitution of steel pipes for cast iron would be of very great advantage. In Newport, they had used Mannesmann tubes for the purpose of carrying mains across the bridges where vibration was extreme.

Mr. F. W. CROSS (Lea Bridge) said in his district they could not point to underground subsidences; but they did have trouble from pressure from above by motors and heavy traction-engines. Regarding the sizes of pipes, he expressed the view that 2-inch pipes were things to be abhored, especially in such a district as South Wales. Referring to Mr. Thomas's work at Porth and Pentre, as described in the paper, the speaker said that, in a paper read by him at Edinburgh in 1895, he had outlined that which Mr. Thomas had carried into effect, and very much what they had adopted at Hong Kong, in 1889 or thereabouts. He could not agree with Mr. Thomas's proposition that any pipe down to an inch was a main.

The CHAIRMAN said he did not agree altogether with what had been said about small pipes. Large pipes were quite as likely to be broken as small ones.

Mr. THOMAS briefly replied. He held to the definition he had given of a gas-main, notwithstanding the remarks of speakers. Gas companies must remember that, though enjoying a monopoly of supply, there were certain obligations under which they were placed to supply gas on demand. He still maintained that local authorities were entitled to a supply under the circumstances he had indicated, just as gas companies were bound to supply anyone who used only 100 cubic feet of gas a year, if a main ran past the house. He could not agree with Mr. Cross that a pipe run to a lamp 50 yards away was a service at all; he called it a main. He used steel tubing for service, but had not had any experience of Mannesmann tubes. He would be doubtful as to the time they would last, especially in a colliery district. In reply to a question, Mr. Thomas added that his unaccounted-for gas at present was about 19 per cent.

PLACE OF NEXT MEETING.

The CHAIRMAN said that it had occurred to some of them that, as Mr. Thornton Andrews, of Swansea, was celebrating his jubilee this year, it might be fitting if they held their next meeting, which was in September, at that town. They had had communication with Mr. Thornton Andrews on the matter; and he had wired them: "I shall have much pleasure in receiving the members in September."

This intimation was received with much satisfaction; and it was unanimously resolved to hold the next meeting at Swansea.

After votes of thanks had been passed to those who had read papers, and to the Chairman, the members adjourned for luncheon, to which they were invited by Mr. Canning.

VISITS TO WORKS.

Early in the afternoon, the party drove in brakes to the Crindau Works of the Newport Gas Company, to inspect the alterations and extensions in the plant now being carried out. The work for these has been entrusted to the Winstanley Speciality Company, Limited, of Birmingham, and is covered by two separate contracts. The first provides for the removal of the old retort-house roof and tiling, the taking down of the chimney stack, and the raising of the walls of the house by 13 ft. 6 in. The old roof is then to be re-erected, with the necessary new principals, and retiled. Provision is also made for the construction of a steel bunker shoot through the existing retaining wall, and taking up the portion of the existing railway siding. This will necessitate the construction of a new line of sidings at a lower level. The present retaining wall will eventually have to be extended for a distance of 20 feet, so as to form cuttings and embankments for the new siding; and considerable alterations will also be required in the coke-hoist now in use. On Wednesday, the members saw that one-half of the walls of the house has already been raised, and several of the roof principals have been re-erected.

Contract No. 2 provides for the removal of the old retort-benches and settings, and the building of twelve new arches, fitted with Winstanley's patent regenerator settings—nine retorts in an arch. The retorts will be 18 feet throughs, of D section, 22 inches by 16 inches. All the ironwork for the benches—such as the mouthpieces, ascension-pipes and bends, hydraulic mains, foul and tar mains, buckstaves, tie-rods, &c.—are included in the contract. It is intended to provide for concrete and steel stage-floors, with expanded steel netting. The steel coal-bunker will have a capacity of 20 tons; and the necessary coal-breaker, elevator and conveyor, and steel charging-bunkers are included. A 30-ton electric crane will be employed for lifting and tipping the coal waggons; while two electric 5-horse power capstans will be used for shunting purposes. For the driving of the coal-breaker, elevator, and conveyor, electric motors will be employed. The miscellaneous work attached to this contract consists in taking up the existing retort-house floors and re-laying them, erecting two chimney stacks, with the necessary bracing, and providing and fixing steel gangways and staircases inside and outside the

house. Some of the work is being undertaken by Messrs. R. & J. Dempster, Limited, of Manchester, as Sub-Contractors for the Winstanley Speciality Company. At the time of the visit of the members half of the new retort-bench had already been erected —up to the springing of the arches; and the lower portions of the regenerators were in. The second half of the old bench will have to continue making gas until the new half is ready for use, when it will be pulled down, and the remaining six new arches and settings erected.

Among other alterations in progress is the erection of another purifier-house, next the present one. This is to be fitted with six boxes on the luteless system—erected by Messrs. Cockey and Son, Limited, of Frome, under Ramsden and Smith's patent.

The interest evinced in this re-construction work occupied the attention of the members for so long a time, that little opportunity was afforded for inspecting the other parts of the works, as arrangements had already been made for a timed visit to be paid to Messrs. Lysaght's Engineering Works; and this could not be postponed. A long drive through the town to the latter works—which are on the banks of the Usk, in the opposite direction to Crindau—enabled the party to see the extensive plate-rolling mills of this well-known firm. The brakes then conveyed the party to the further bank of the river, where an opportunity was afforded of inspecting the now well-known Transporter Bridge, which is rapidly approaching completion. Here an interesting description of the arrangement was given by Mr. R. H. Haynes, of the Borough Engineer's office.

EXPLOSIVE COMBUSTION OF HYDROCARBONS.

The April issue of the "Journal of the Chemical Society" contains a paper upon the above subject, written by Dr. W. A. Bone, F.R.S., and Dr. J. Drugman, in the course of which the theory of the preferential combustion of carbon in flames, recently revived by Misteli,* is shown to be untenable as a general theory of hydrocarbon combustion. In former papers, it was proved that the slow combustion of a hydrocarbon involves the initial formation of unstable hydroxylated molecules; and the aim of the present communication is to demonstrate that there is probably no real difference between slow combustion and rapid or "explosive" combustion. The term "explosive combustion" or "explosion" is defined by the authors as a propagation of flame through a combustible mixture under ordinary conditions of "inflammation," not as the conditions which exist when an explosion wave ("detonation") is set up.

When only the end results of an explosive combustion are considered, the effects produced by the ignition of an equimolecular mixture of an unsaturated hydrocarbon (an olefine or an acetylene) conform to the requirements of the theory of preferential carbon combustion; for there is no separation of carbon, very little (if any) formation of steam, and the cooled products consist chiefly of carbon monoxide and hydrogen in accordance with the empirical equation—

$$C_nH_{2n} + n/2O_2 = n\ CO + n\ H_2.$$

But if the hydrocarbon is a paraffin, much carbon and steam are always formed; and besides the carbon monoxide and hydrogen, the products contain between 8 and 10 per cent. of methane, fair proportions of unsaturated hydrocarbons (acetylene and ethylene), and of carbon dioxide. Moreover, if an olefine is exploded with less than an equimolecular proportion of oxygen, much water and carbon are formed—the quantity of water increasing as the proportion of oxygen is still further reduced. If a mixture of an olefine with hydrogen and oxygen is prepared in the proportions $C_nH_{2n} + H_2 + n/2O_2$—a mixture containing the same relative amounts of gaseous carbon, hydrogen, and oxygen as exist in an equimolecular mixture of a paraffin with oxygen—the olefine mixture yields no carbon and very little steam when ignited; and its behaviour is thus in striking contrast to that of the paraffin mixture. Again, in many cases of the explosive combustion of hydrocarbons, direct evidence has been obtained of the formation of aldehydes; and the authors have satisfied themselves experimentally that bodies of the aldehyde class cannot possibly be produced at high temperatures by interchanges in the system CO, H_2O, H_2, and CO_2. Hence the theory of the preferential combustion of carbon fails to explain the characteristic behaviour of olefines; whereas the latter becomes intelligible if the initial formation of hydroxylated products is admitted.

In the authors' experiments, combustible mixtures were fired in a sealed-up cylindrical glass bulb having too small a capacity (60 c.c.) to allow an explosion "wave" to be set up. When equimolecular mixtures of ethylene or acetylene with oxygen were ignited, the ratios of the final pressures of the "nitrogen-free" products to the original pressures of the "nitrogen-free" mixtures (p_2/p_1), as well as the composition of the gaseous products, always corresponded with the equations—

$$C_2H_4 + O_2 = 2CO + 2H_2$$
$$C_2H_2 + O_2 = 2CO + H_2$$

except that a little methane was formed. But when a similar mixture of ethane and oxygen was ignited, the ratio p_2/p_1 was only about 1·5 instead of 2·5, a dense cloud of carbon and steam filled the tube, and the products contained nearly 4 per cent. of carbon dioxide, 10 per cent. of methane, appreciable quantities of acetylene and ethylene, as well as carbon monoxide and hydrogen. On rinsing the bulb afterwards with water, the liquid recovered always gave a strong aldehyde reaction when submitted to Schiff's test. The ratio H_2/O_2 in the condensed products was generally somewhat over 2—a circumstance that may perhaps be connected with the formation of acetaldehyde. Large differences in the original pressures under which the mixtures were held in the bulb made no appreciable difference in the results of igniting ethylene; but when ethane was tested, the unsaturated hydrocarbons and the steam tended to increase inversely with the original pressure. The authors estimate that between 12·5 and 16·5 per cent. of the carbon in the ethane, and from one-third to two-fifths of the original oxygen were not accounted for in the gaseous products. Steam does not seem to be present in combustion products of ethane and absent from those of ethylene owing to the much lower flame temperature of the latter, because the total evolution of heat (*ceteris paribus*) is greater in the first case than in the second.

When higher paraffins (propane and *n*-butane) were ignited in the same manner, similar phenomena were observed as when ethane was under examination. The gaseous products contained 8 or 9 per cent. of methane, 3 to 5 per cent. of unsaturated hydrocarbons, and about 4 per cent. of carbon dioxide. On testing methane itself with an equal volume of oxygen, the products were found to contain about 1 per cent. of methane and 5·7 to 6·8 per cent. of carbon dioxide; p_2/p_1 varying only between 1·02 and 1·03, though p_1 varied from 335 to 651 mm. The proportion of the original oxygen recovered in the steam was sensibly constant at 43·5 to 44·8 per cent. With higher unsaturated hydrocarbons, the results differed somewhat, according to the proportions of oxygen employed. From mixtures of propylene and trimethylene with one-and-a-half times their volume of oxygen, no carbon separated; but in some cases a little dew was to be seen. Equimolecular mixtures yielded free carbon and a quantity of water representing 25 per cent. of the original oxygen. The average ratio H_2/O_2 was nearly 2·6, suggesting the formation of something besides water in the condensates. When a mixture of propylene corresponding with the formula $C_3H_6 + 1\frac{1}{2}O_2$ was fired, only 21 per cent. of the original oxygen was discovered in the condensed products, and the ratio H_2/O_2 was exactly 2. On exploding *n*-butylene with twice its volume of oxygen, the ratio p_2/p_1 was 2·43, as compared with 2·2 in the case of *iso*butylene. No carbon and only a visible amount of dew were formed. With one-and-a-half volumes of oxygen, carbon and much water were produced, and the aldehyde reaction was distinct. Between 24 and 28 per cent. of the original oxygen appeared in the condensates.

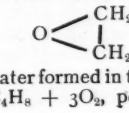
When a mixture of $C_3H_6 + O_2$ was exploded, much carbon and water were produced, and over 27 per cent. of the original hydrogen was found in the condensed products. When an arithmetically identical mixture of $C_2H_4 + H_2 + O_2$ was exploded, no carbon was liberated; only sufficient steam was formed to be visible; and, according to the initial pressure, from 5 to 8 per cent. of the original hydrogen was in the condensed products. When the mixture was composed of $C_2H_2 + 2H_2 + O_2$, neither carbon nor steam was to be seen, and the proportion of condensable hydrogen was negligibly small. Hence hydrocarbons are certainly not decomposed into their elements before combustion. At the temperatures prevailing in ordinary flames, they exhibit an enormously greater affinity for oxygen than does either hydrogen or carbon. Acetylene differs from all the other unsaturated hydrocarbons examined inasmuch as there is little or no formation of steam when the oxygen is reduced below an equimolecular proportion. Part of the acetylene burns to carbon monoxide and hydrogen, and the remainder is resolved into carbon and hydrogen *plus* a little methane. Indeed, it would appear that something tantamount to direct conversion of the C_2H_2 into $C_2H_2O_2$ occurs in flames.

Although, as has already been mentioned, evidence of the formation of aldehydes is sometimes to be obtained directly, or by withdrawing some of the interconal gas from the flame of ethane or ethylene burning in a modified Smithells separator, it is much easier to demonstrate the occurrence of aldehyde in a flame of air or oxygen burning in coal gas or in a hydrocarbon such as ethane or ethylene. The authors have designed a very convenient form of apparatus for carrying out the test, which they describe in their original communication.

The foregoing results seem to prove that a hydrocarbon is not decomposed to any great extent in a flame, except when the supply of oxygen is severely limited; it is certainly not resolved into its elements. Probably the "oxygenated" hydrocarbon is the substance that decomposes. The behaviour of methane in a flame is best explained thus:

$$CH_4 \quad CH_3{\cdot}OH \longrightarrow CH_2(OH)_2 \longrightarrow CH_2O + H_2O$$

the formaldehyde (CH_2O) decomposing into $CO + H_2$ at the high temperature obtaining. In the case of ethylene, so much water is produced when the mixture $3C_2H_4 + 2O_2$ is exploded, that it seems more likely that a monohydroxy derivative, $CH_2 : CH \cdot OH$, is produced than such a molecule as



The large quantity of water formed in the explosions of $3C_2H_4 + 2O_2$ $C_3H_6 + O_2$, and $2\ C_4H_8 + 3O_2$, points to the production of

* See "JOURNAL," Vol. XCIII., p. 291.

monohydroxy, rather than dihydroxy, derivatives; and the same thing is indicated by the phenomena of low-temperature combustion, where the rate of oxidation is greatly retarded by an excess of oxygen over and above an equimolecular proportion, but is hardly, if at all, retarded by a corresponding excess of hydrocarbon. In certain conditions (*e.g.*, detonation), the dihydroxy-derivative may be produced direct. Possibly this occurs with acetylene.

The suggestion that oxygen acts directly upon a hydrocarbon without the intervention of steam is opposed to the view held by Armstrong, who fails to see why, if this is the truth, dihydroxy-derivatives should not be formed at once. But it may be that in flames the oxygen does not exist entirely in the molecular condition; and, moreover, the difficulty urged does not seem greater than that involved in the idea that the formation of a hydroxy-derivative always requires the simultaneous conjugation of hydrocarbon, water, and oxygen. At present, it does not appear that presence of water is necessary for hydrocarbon combustion.

On the whole, then, in an adequate supply of oxygen, the combustion of an olefine (*e.g.*, propylene) involves successive eliminations of formaldehyde, which immediately decomposes into carbon monoxide and hydrogen, thus:

$$CH_3{\cdot}CH:CH_2 \xrightarrow{(1)} CH_3{\cdot}CH:CH{\cdot}OH \longrightarrow$$

$$CH_2:\overset{(2)}{CH_2} + CH_2O \longrightarrow \overbrace{CO + H_2}$$

$$CH_2:\overset{(3)}{CH}{\cdot}OH \longrightarrow \overset{(4)}{CH\,(OH)}:CH{\cdot}OH$$

$$\overbrace{\qquad\qquad\qquad\qquad}$$

$$2CH_2O = 2CO + 2H_2$$

With only two-thirds of the above amount of oxygen, the process would stop at stage 3, and the product would break down into acetylene and water, or into carbon, hydrogen, and water. Since acetylene yields much methane when decomposed by heat, the presence of as much as 10 per cent. of methane in the explosion products of $C_2H_2 + O_2$ is explained.

A paraffin may be considered to burn in either of two ways: (1) As at the lower temperature, aldehyde and steam being formed early—

$$CH_3{\cdot}CH_2{\cdot}CH_3 \longrightarrow CH_3{\cdot}CH_2{\cdot}CH_2{\cdot}OH \longrightarrow \overbrace{CH_3{\cdot}CH_2{\cdot}CH(OH)_2}$$

$$\overbrace{\qquad\qquad\qquad\qquad}$$

$$CH_3{\cdot}CH_2{\cdot}CHO + H_2O$$

the aldehyde then decomposing to yield carbon monoxide and the lower paraffin, and the whole process being repeated until at length the acetaldehyde breaks down into carbon, hydrogen, methane, and carbon monoxide. (2) According to the alternative hypothesis, the primary oxidation product $C_nH_{2n+1}{\cdot}OH$ may decompose into $C_nH_{2n} + H_2O$, and the olefine may then continue the process in its own peculiar way.

In view of the direct bearing of the subject upon the behaviour of internal-combustion engines, one of the authors hopes to continue the research under much higher original pressures than those which have hitherto been employed.

HYGIENIC ASPECT OF INVERTED GASLIGHTS.

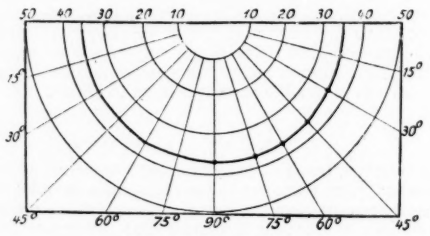
Recent issues of the "Journal für Gasbeleuchtung" contain a lengthy article, written by Dr. F. Ballner, a physician attached to the Austrian Army, upon the incandescent gaslight viewed from a hygienic aspect. The greater portion of his communication is taken up with a discussion of the amount of radiant heat produced per unit of light by different types of gas-burners; but there is a good deal of introductory matter that must be studied in order to gain a proper comprehension of the results at which the author has arrived.

The energy consumed in evolving light is made manifest in two different ways—part of it appearing as radiant energy and part as conducted heat. The latter is transferred to the structure of the burner and to the air in the vicinity. From a hygienic aspect, it is of less importance than the radiant energy. The radiant energy is composed of rays that cover the whole field between the wave-lengths 60μ and 0·4μ. The rays having wave-lengths lying between 0·8 and 0·4 affect the eye; the former being at the extreme red end of the visible spectrum, and the latter at the extreme violet end. The rays between 60μ and 0·8μ are invisible or heat rays. In the course of the investigation he carried out some ten years ago, Rubner described the various symptoms experienced by a person unduly exposed to the radiations from a source of light. He found that a person whose face was exposed to the light of a 15-candle power argand burner at a certain distance began to feel only an indefinite sensation of warmth, next a sensation of heat in the eyes and root of the nose, then a tension of the forehead, afterwards a burning of the eyes and a tendency to shed tears, and finally extreme dryness and heat in the eyes. He also found that the symptoms described were produced by a smaller quantity of radiant energy in a warm room heated to the temperature of 70° or 80° Fahr. than in a cool room when the thermometer did not rise above 57° Fahr.—in other words, that more than twice as much radiant heat can be borne in a cool room as in one that is overheated. Rubner also observed, as the result of experiments on numerous persons, that the ideal quantity of heat received from a source of light ought not to exceed 35 microcalories per square centimetre per minute, but that in practice 50 microcalories might be considered as the utmost permissible from a hygienic standpoint. [The microcalorie referred to in this abstract is defined by Ballner as the one-thousandth part of the small freezing-point calorie—*i.e.*, represents the amount of heat necessary to raise 1 milligramme of water from 0° to 1° C.] In his examination of actual sources of artificial light, Rubner observed great variations in the quantity of radiant heat emitted; his maxima and minima being 14·44 and 1·25 microcalories per square centimetre per minute, measured at a constant distance of 37·5 centimetres (14·8 inches) from the radiant. He discovered the petroleum lamp was the least advantageous source of light from the present aspect; the Welsbach light being the best, and the electric glow lamp the second.

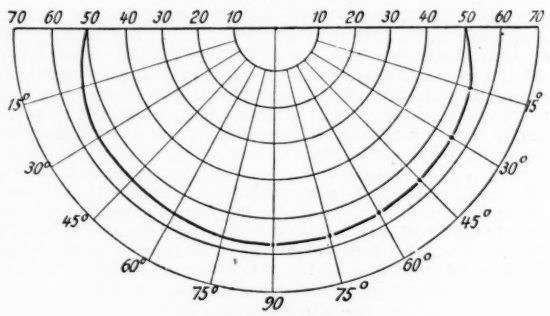
The Burners Examined.

Dr. Ballner has taken up the subject of the amount of heat radiated from inverted burners on the ground that the great differences in their design from the typical upright incandescent must alter the ratio between quantity of radiant heat and illuminating power which Rubner and others have found to obtain in the case of ordinary Welsbach burners. In the inverted burner, a much larger proportion of the total heat evolved is communicated to the metal and glass portions of the burner, and to the gas and air before ignition occurs. For the purposes of comparison, he has also tested other varieties of gas-burners; the samples examined comprising a flat-flame burner, an argand, apparently three different specimens of the upright Welsbach (one of which had been in regular use for a considerable period of time), a small inverted incandescent made by Kramer, of Berlin, and a large inverted burner constructed by the Incandescent Gas Company of Vienna.

The burners were tested for consumption at a pressure of 15-10ths, for illuminating power and duty, on a Weber photometer. In the case of the inverted burners, lower hemispherical candle power was determined every 15 degrees between the horizontal and the vertical; and the average was taken for comparison. In other tests, the inverted and the upright burners were compared in their most advantageous directions—viz., horizontally with the upright burners; at a depending angle of 45° with the inverted specimens. The lower hemispherical candle-power developed by the Kramer inverted burner is plotted on Diagram No. 1, and that by the Vienna burner on Diagram No. 2.



No. 1. Kramer Burner.



No. 2. Vienna Burner.

The individual results given by these and the other burners are also collected in the following table (No. 1) after recalculation of the figures into British units. Where marked with an asterisk, the data relate to mean lower hemispherical candle power; elsewhere they refer to the light and duty emitted in the most advantageous direction, as already stated.

It will be seen that there is little to choose in efficiency between the two different inverted burners examined. From a physiological aspect, however, it is important that the light shall be perfectly steady and uniform. Want of steadiness in a light strains the iris and the accommodating muscles of the eye very severely. The Vienna inverted burner gave a perfectly steady light, but the specimen of the Kramer burner that was tested flickered somewhat and produced a crackling ("boiling") noise,

however carefully the gas supply and the size of the air inlets were regulated.

TABLE I.

Type of Burner.	Consumption Cubic Feet per Hour.	Illuminating Power.	Candles per Cubic Foot.
Flat-flame	7·00	15·8	2·26
Argand	4·13	14·3	3·5
Welsbach (old)	4·67	46·7	10·0
Welsbach (new)	4·88	72·0	14·7
Welsbach (?)	3·96	53·0	(13·4)
Kramer inverted	2·14	31·6	14·8
Kramer inverted*	1·98	30·7	15·5
Vienna inverted	3·01	47·0	15·6
Vienna inverted*	3·00	46·5	15·5

MEASUREMENT OF THE RADIANT HEAT.

In measuring the heat radiated from the different burners, the method already employed by Rubner was followed closely. A D'Arsonval galvanometer was used, connected with a Melloni thermopile carried on a bar divided into centimetres. The connection between the pile and the galvanometer was a switch which could be opened or closed, or employed to introduce any desired resistance into the circuit. In order to concentrate the rays falling upon the thermopile, it was provided with a trumpet mouth pointing to the source of light; a removeable cover fitting either the mouth of the trumpet or the back of the pile, so as to assist in maintaining the instrument at the temperature of its surroundings. The apparatus was standardized by means of a glass bulb, 5·3 centimetres in diameter and 88·2 square centimetres in superficial area, filled with pure mercury. The bulb was cleaned with alcohol and ether before each test, and was heated in a platinum basin till the thermometer in it showed a certain elevated temperature. The bulb was then lifted with a fine wire and supported on a stand in front of the thermopile. According to Stefan's law, the amount of heat falling on each square centimetre of the thermopile per minute from the mercury bulb, after raising it to an absolute temperature of T°, is given by the annexed equation, where e is the distance from the centre of the bulb to the plane of the thermopile, t the absolute temperature of the surrounding air, and n the reading of the galvanometer scale:—

$$W = \frac{1{\cdot}0846 \times 10^{-12}(T^4 - t^4) \times 60 \times 88{\cdot}2}{4\, e^2\, \pi \times n}.$$

As a result of four different sets of experiments, in which the mercury bulb was raised to known temperatures varying between 93° and 138° C., it was found that 1° of deflection of the galvanometer needle was equivalent to 0·000162 gramme-calorie—*i.e.*, to 0·1621 microcalorie.

With the aid of the apparatus thus arranged, the quantities of heat radiated horizontally per unit of light emitted by the different burners were measured; and the average of many results in each case are recorded in Table II. The upright Welsbach burner tested was the same specimen as the third mentioned in Table I. The figures in the second vertical column of Table II. represent the number of microcalories received per minute upon a surface of 1 square centimetre at a constant distance of 37·5 centimetres from the source of light per 1 Hefner unit developed. Actually, the measurements were carried out at distances of 100 and 150 centimetres between the spherical centre of the mantle and the plane of the thermopile, but were recalculated by Ballner to the constant distance of 37·5 centimetres, in order to bring them into agreement with the figures previously placed upon record by Rubner. In the third vertical column, Ballner's data have been recalculated into microcalories received per minute upon a surface of 1 square foot at a distance of 1 foot from a light of 1-candle power—the conversions being effected by multiplying the metric figures by

$$\left(\frac{37{\cdot}5}{30{\cdot}479}\right)^2 \times 6{\cdot}451 \times 1{\cdot}14 = 11{\cdot}132;$$

30·479 being the number of linear centimetres in a foot, 6·451 the number of square centimetres in a square foot, and 1·14 the number of Hefners in 1 British candle power.

TABLE II.

Type of Burner.	Microcalories per Hefner Unit per Sq. Cm. per Minute at 37·5 cm. Distance.	Microcalories per Candle Power per Sq. Foot per Minute at 1 foot Distance.
Flat-flame	5·2	58·0
Argand	6·5	72·4
Welsbach	1·4	15·6
Kramer inverted { globe only	1·73	19·25
Kramer inverted { with shade	1·469	16·35
Vienna inverted { globe only	1·864	20·72
Vienna inverted { with shade	1·418	15·8

In similar conditions, Rubner found values ranging from 5·3 to 7·76 for a flat-flame burner, 7·2 for an argand, and an average of 1·25 for ordinary Welsbachs.

When the Kramer burner was being tested, it made no difference to the readings whether the opening through which the combustion products escaped was turned to or away from the thermopile; but in the case of the Vienna burner, the recalculated quantity of radiant heat, which was 1·896 microcalories when the closed part of the burner was directed towards the pile, rose to 2·837 on turning the outlet for the products towards the instrument. Both burners emitted more radiant heat when in an upward direction than horizontally; the radiant energy in the former direction being increased by that given off from the hot products of combustion and by the heat issuing from the burners themselves. In one experiment, where the thermophile was placed at a distance of 100 centimetres from the upper end of the Kramer mantle, the galvanometer showed a deflection of 72°; the corresponding reading in a horizontal direction at an angle of 45° below the centre of the mantle being 56° of the scale. In a similar test with the Vienna burner, where the thermopile was placed vertically at a distance of 150 centimetres away, the deflection was 65°, as compared with a deflection of only 37° when the thermopile was arranged horizontally at an angle of 45° below the burner. All the measurements were made upon new burners that had only been alight for a comparatively few hours.

In Table III. are shown the amounts of heat radiated from the two inverted burners when alight, tested with and without the inner globe, and the corresponding quantities radiated from the hot portions of the burners themselves immediately after the flames were extinguished. The figures in the second vertical column are the deflections of the galvanometer recalculated for the standard distance of 37·5 centimetres. It will be seen that the presence of the globe increases the illuminating power of the flame, presumably by checking losses of heat, but also by protecting the flame from draughts, and so enabling it to fill the mantle more thoroughly. The globe has also a small effect in reducing the amount of radiant heat given off.

TABLE III.

Type of Burner.		Deflection at 37·5 cm.	Illuminating Power, Hefner Units.	Microcalories per Hefner Unit.
Kramer light	with globe	394·3	37	1·718
	without globe	423·4	31·9	2·139
Kramer burner	with globe	277·3	—	—
	without globe	65·7	—	—
Vienna light	with globe	518·3	56	1·508
	without globe	532·9	42	2·059
Vienna burner	with globe	284·7	—	—
	without globe	189·8	—	—

Hence it appears that the greater part of the heat is radiated from the hot metal and glass portions of the burners themselves. The differences between the readings given by the extinguished burners with and without globes—viz., 211·6° and 94·9° respectively—indicate the amounts of heat radiated by the globes. The Kramer globe weighed 45 grammes; the Vienna globe, 31 grammes. This fraction of the radiant heat must diminish with the weight of the glass article emitting it; and therefore the inverted burner has an advantage over the upright burner, inasmuch as the chimney of the latter (the analogous glass object) weighs two or more times as much as the inverted globe. The amount of heat radiated from the electric light is roughly double that emitted by the upright Welsbach.

The heating effects of a source of artificial light may also be judged to a certain extent from the colour of its flame; being the greater as the light contains a larger proportion of red rays. Hence if the illuminating power of the light is measured in terms of red (R) only and green (G) only, tinted glasses being employed on the photometer, the amount of radiant heat per unit of light is the smaller as the fraction $\frac{G}{R}$ is the greater. The ratio in question was measured for all the burners under examination, and was found to be 1·12 for the argand, 1·14 for the flat-flame burner, 2·2 for the upright Welsbach, and 2·3 for both the inverted burners—figures which will be seen to vary inversely with the microcalories recorded in Table II.

Available Illumination.—Another hygienically important point in considering the values of different lights is the intensity of the illumination they yield when brought so close to the person using them that he is exposed to the maximum permissible amount of radiant heat. This value, expressed in "meterkerzen" or the like at the minimum permissible distance, has been termed by Rubner the "available illumination." Since Rubner has laid down two maxima for the radiant heat, each burner exhibits two values for its available illumination. The minimum distance (x) is calculated thus

$$x = \sqrt{\left(\frac{K \times I \times d^2}{D}\right)},$$

where K is the radiant heat per 1-candle power in terms of the galvanometer scale or absolute measurements, d the distance at which the heat is measured, I the illuminating power developed, and D the distance at which the radiant heat reaches one or

other of Rubner's maximum values (see above). Calculated per 1 Hefner unit, the available illumination then becomes

$$\left(\frac{100}{x}\right)^2 \text{ meterkerzen.}$$

With the Kramer burner, the "ideal" value of D was found to be 216 divisions of the working scale, and the "practical" value 308 divisions. Hence the "practical" distance x is

$$\sqrt{\left(\frac{11 \times 36 \times 37{\cdot}5^2}{308}\right)} = 42{\cdot}5;$$

and the "ideal" distance is

$$\sqrt{\left(\frac{11 \times 36 \times 37{\cdot}5^2}{216}\right)} = 50{\cdot}7.$$

Therefore the maximum available illumination afforded by the Kramer burner under "ideal" conditions is

$$\left(\frac{100}{50{\cdot}7}\right)^2 \times 36 = 140{\cdot}4 \text{ meterkerzen } [11{\cdot}44 \text{ candle-feet}];$$

and under "practical" conditions, 198 meterkerzen [16·14 candle-feet].

Similar calculations applied to the Vienna inverted burner lead to a maximum "ideal" illumination of 140 meterkerzen, or 11·4 candle-feet, and a maximum "practical" illumination of 201·16 meterkerzen, or 16·4 candle-feet. The upright Welsbach burner, tested by Rubner himself, exhibited corresponding values of 164 and 274 meterkerzen—*i.e.*, of 13·4 and 22·3 candle-feet.

Ratio of Radiant Heat to Total Heat.

If the calorific value of the gas consumed in each of the burners per hour in the development of unit light is known, it becomes possible to calculate the proportion which the quantity of radiant heat emitted bears to the total heat produced by the combustion. The work was carried out with Innsbruck gas, which, as a mean of six determinations in the Junkers calorimeter, was found to possess a gross calorific value of 5650 large calories per cubic metre (160 large calories per cubic foot), and a net value, after deduction of the latent heat of the steam produced, of 5110 large calories per metre (144·6 per foot). Table IV. shows the total gross and net amount of heat evolved per hour in large calories per 1 Hefner of light, and the proportion to these totals of the quantity of radiant heat emitted under the same conditions. The figures can be converted into British units by multiplying by 1·14 (the correction for our larger "candle").

Table IV.

Type of Burner.	Total Heat per Hefner Unit per Hour.		Radiant Heat as a Percentage of the Total Heat.	
	I. Gross.	II. Net.	I. Gross.	II. Net.
Vienna	9·7	8·7	20·1	22·5
Kramer	9·78	8·84	18·8	20·8
Argand	40·11	36·28	17·3	19·2
Flat-flame	62·15	56·21	8·6	9·5

The total heat developed by an upright Welsbach burner examined by Rubner was 8·07 large calories net per hour per 1 Hefner. From a thermic standpoint, the electric glow lamp is a better source of light than incandescent gas. According to Rubner, its total evolution of heat is only one-sixth that of the incandescent gas-burner, although its radiation of heat is somewhat greater. Rubner quotes the radiation from a glow lamp as 2·63 microcalories per minute upon a surface of 1 square centimetre at a distance of 37·5 centimetres—*i.e.*, rather more than that of the gas-burners. After deducting the latent heat of the water-vapour, Rubner found that the radiant heat of Welsbach burners represented 17 per cent. of the total heat, whereas the radiant heat of a glow lamp is 71 per cent. of its total heat.

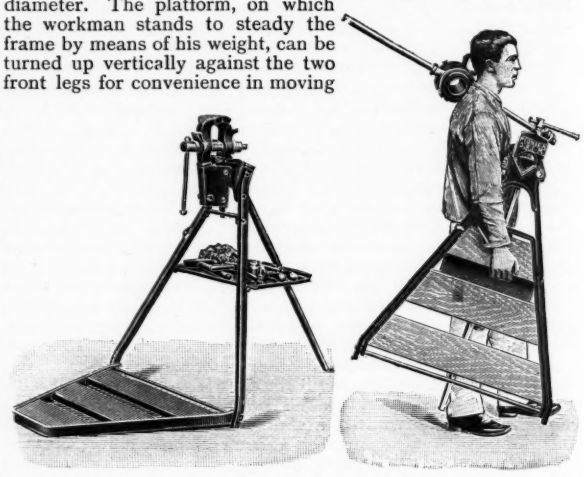
The Bland Inverted Light.—Messrs. Bland and Co., whose inverted lamps were described in the "Journal" on Jan. 9, have made certain improvements in their productions which will be appreciated. They are now fitting an adjustable nipple to the burners, which will enable the pressure of the gas to be controlled from the burner itself—thus ensuring a perfect mixture under varying conditions. The lamps are also being made with bye-passes; and the design of other changes is to materially add to the strength and durability of the lamps.

Gasholder Guidance.—Adverting to the articles which appeared in the "Journal" on Jan. 30 and Feb. 6 last under this title, we are informed by Mr. Gadd that already several of the foreign applications for patents for the invention described—"whereby a simple vertical rise and fall may be given to the holder, while at the same time it is supported by spiral guides"—have been finally allowed. These include the United States of America, where the examinations are very severe. This, he says, proves the novelty of the invention without a doubt. In fact, in no country has the examiner been able to make a single citation against the grant; and hitherto the specifications have been accepted without the slightest modification after filing.

A PORTABLE BENCH AND VICE.

Few mechanics who have had to do outdoor work have not at times felt the need of a portable bench, by the aid of which they would have been able to carry out on the spot some piece of work which has necessitated a journey to the shop. Such an appliance has now been provided by the Union Standard Machine Company, of No. 165, Queen Victoria Street, E.C., in the portable bench and vice shown in the illustrations.

The portable bench is supplied with a pipe-clamp and vice, for pipe-threading, or with vice only. The jaws of the latter are 3½ inches; but, if required, the bench can be supplied with a vice of larger size. The pipe-clamp takes pipes up to 2 inches diameter. The platform, on which the workman stands to steady the frame by means of his weight, can be turned up vertically against the two front legs for convenience in moving



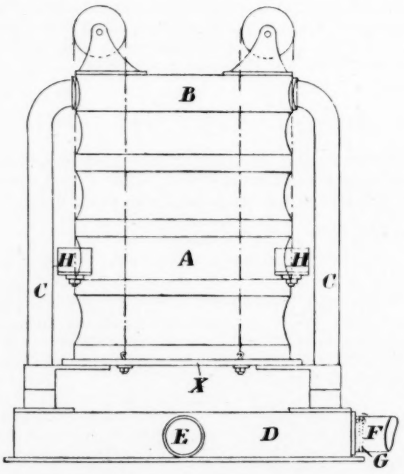
the complete bench from place to place; while the back leg, which is also hinged, can be folded up against the bench; thus forming a flat and very convenient apparatus, which when not in use requires only a very small space for storage. The weight of the bench with the vice is 85 lbs.; without it, 50 lbs. As the makers of these benches have received a number of orders for them from leading gas-works, fitters, and others, they appear to have proved useful as substitutes for the heavy and cumbrous benches hitherto in use.

REGISTER OF PATENTS.

Automatically Sustaining the Suction Influence in Suction Gas-Producers.—Thwaite, B. H., of Great George Street, S.W. No. 7904; April 13, 1905.

This invention has for its object to provide a remedy for the intermittent working of Otto-cycle gas-engines, especially those working under irregular loads.

The apparatus employed consists of a circular bellows, similar in construction to the bellows associated with portable smiths' forges, but considerably extended; and it may be arranged to act in its extension and contraction, either vertically (as shown) or horizontally. When the apparatus is forcibly extended, it acts as an aspirator.



The fixed end of the cylindrical bellows A, which has a hollow steel top cover B, is connected to three or four supporting standpipes C leading from the suction gas-main or hollow foundation D, by which it is connected, first to the gas-producer at E, and, second, to the gas-engine at F. The latter connection is, however, equipped with light mica or

aluminium framed, non-return swing or hanging valves G, so that when the bellows are extended they cannot draw gas from the gas-engine direction. The movable bottom cover or weighted end-plate X of the bellows is lifted or drawn up by any mechanical means. For small engines, a coil spring may be used, or even a balanced lever; but for engines of considerable proportions the gravity effect of a suspended weight or weights H (hanging from light pulleys mounted on roller bearings) is used, which permit the suction effect to be accurately adjusted.

The fall of the weighted end-plate X extends the bellows—but only when the pull of the engine is arrested by the closing of the gas-inlet valve of the engine. When it is raised or opened, the suction effect gradually draws the gas away from the bellows, which proportionately contract, lifting the weighted end-plate. It will therefore be realized that the bellows are alternately rising and falling.

When the gas-engine suction-effect is arrested, the suspending weighted end-plate begins to fall, drawing out the bellows gradually and to almost its full extent. The suction effect is therefore brought to bear upon the suction gas-producer in the periods intervening between the times of the opening of the gas-inlet valve of the engine.

Suction Gas-Producers.—Lane, H., of Birmingham. No. 10,632; May 22, 1905.

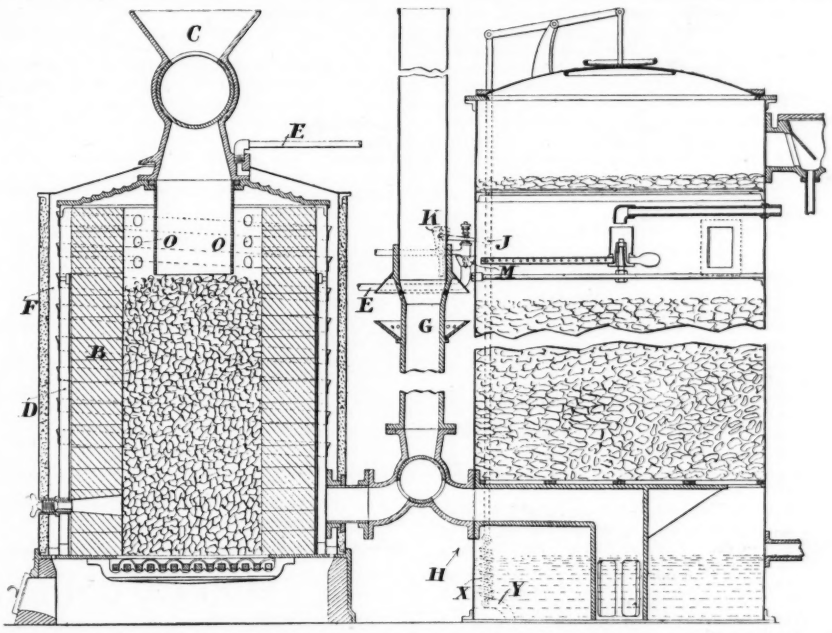
This invention relates to a gas-producer the body of which has been built up of three cylindrical vertical casings of different diameters, disposed one within the other so as to provide respectively a fuel cavity, a vaporizing space, and a gas space—air being supplied to the vaporizing space by a fan; and also in which water has been supplied to a vaporizing space by an automatic arrangement variable in its working according to the demand for gas.

The producer (as shown) consists of a series of preferably cylindrical vertical metal casings arranged concentrically one within the other. The innermost casing is provided with a fire-brick lining B and grate; the latter being preferably constructed with loose fire bars, which may be rotated or withdrawn and replaced without interfering with the action of the producer. A trap feed hopper C is provided for the supply of fuel to the innermost casing. The second casing provides between itself and the innermost casing an annular space D communicating at the top with the fuel cavity by openings O. An outlet from this annular space is provided near the bottom, leading to a two-way cock or an equivalent device. On the exterior surface of the second casing, which is closed in at its top, is a spirally arranged trough or channel extending approximately from top to bottom. The cover is also provided on its exterior surface with a spiral-volute arrangement of trough. A pipe E supplies water to the latter channel to run or trickle down and round the channel and thence all round the casing. An annular vaporizing space F surrounds the casing and troughs; and atmospheric air entering at the crown of the producer passes down this space and into a space beneath the furnace grate or hearth, which is closed by a cast-iron box. The hearth space leads through the fuel.

The two-way cock referred to is adapted to at one time direct the products from the producer into the chimney G and at another time into the washing, scrubbing, or cleansing apparatus H. This apparatus is of ordinary construction, and has a flap or non-return valve at the outlet, which communicates with the fan or other device which creates the suction or vacuum on the entire apparatus when once started. At the top of the apparatus is a flexible diaphragm connected with a lever pivoted in a bracket; the other end of the lever being connected to a rod to the other end of which is connected a spring X, fastened to a staple Y. The rod is also pivoted at J to one end of a lever controlling the water supply to the pipe E. The diaphragm is pulsated by the suction created by the engine or fan thus rocking the lever. The lever is pivoted (at the opposite end to the rod) to a quadrant, and, near its middle, is bifurcated on to a valve-rod, which lifts or closes the valve from or on to its seating.

By the use of the flexible diaphragm and valve, the supply of water to the pipe E is controlled in exact proportion to the gas sucked from the producer. At a point near its base, the chimney G is enlarged and perforated, and immediately below the enlarged part is a small annular grate, upon which may be burnt light combustible material, the products from which will enter through the perforations together with air, causing a pull from the lower part of the chimney, which will assist the burning of the fuel in the producer.

The action of the apparatus is as follows: Having placed the two-way valve so that the gas-producer is in communication with the chimney, a fire is lit in the grate and supplied with fuel—preferably anthracite coal or coke. To aid the burning of the producer fire, a small fire is lit in the chimney grate which will induce air currents in the chimney and through the spaces D and F. The gases from the producer furnace soon become themselves combustible and ignite when they reach the perforations—the draught at once becoming further accentuated. By this time the vaporizer or casing has become well heated. A little water is now admitted into the supply pipe E, which



trickles down the vaporizing troughs. This water is at once evaporated, mixes with the descending air, and enriches the gas passing to, and being burnt within, the chimney, so that the draught reaches a maximum; and the fuel in "the gas-producer forthwith attains incandescence and is ready for work." The two-way cock may now be altered so that the gas coming from the producer is diverted into the cleansing apparatus H.

Automatically Lighting and Extinguishing Illuminating Apparatus.—Bröndum, M. V., of Aarhus, Denmark. No. 1561; Jan. 20, 1906.

This invention relates to a device for automatically effecting at a predetermined time the lighting and extinguishing of lamps, &c., and consists in "the combination of parts forming the whole device" as shown on p. 378, and to be described.

The front of the apparatus (fig. 2) is provided with five key-holes, one of which (A) serves to turn the cut-off valve or cock independent of any mechanism. Two holes B and C serve for winding the actuating springs; and the two remaining holes D and E are for adjusting the time of lighting and extinguishing. Arranged beneath a glass F are two indicating pointers, which rotate in front of a plate divided into twenty-four divisions.

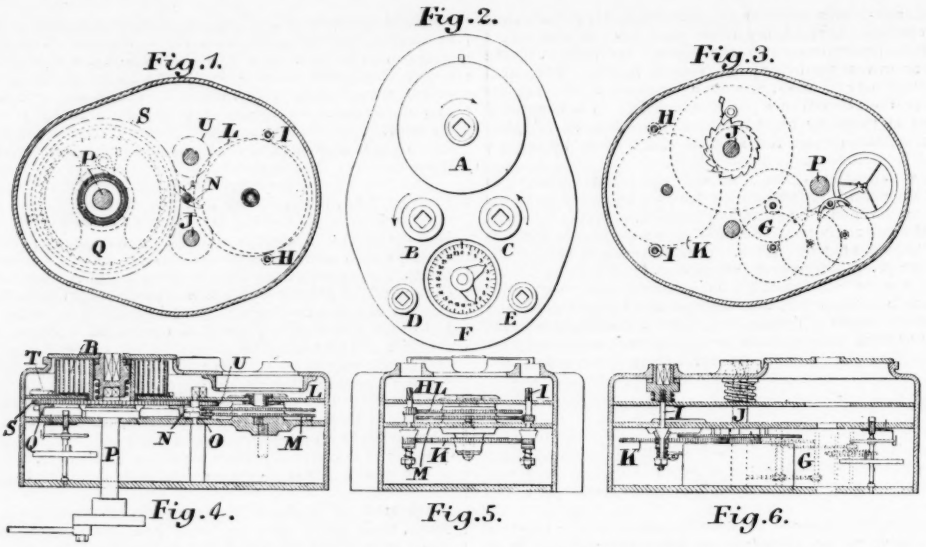
Figs. 3 and 6 show the connection between the clockwork G and the main shafts H and I, driven through two friction clutches and receiving their actuation from the shaft J as follows: An intermediate wheel K drives, through the intermediary of friction clutches, the shafts H and I; and toothed wheels fixed on the latter are each in engagement with hour-wheels L and M, so that they make one rotation in twenty-four hours, and with each of which is connected one of the indicating pointers. Each hour-wheel is provided with a pin which, by rotation of the wheels, comes in contact with one of two latch levers N and O, and releases it. The levers are arranged one above the other, so that each hour-wheel trips one lever.

The cut-off mechanism is connected with a shaft P provided with a rachet-wheel having only a single tooth and connected by means of a detent with a wheel Q having lugs on its circumference, so arranged that one lug abuts against the latch lever N, and the other against the lever O. The said lugs are disposed diametrically opposite one another.

The working spring R is mounted on a sleeve firmly connected with the wheel Q; and the outer end of the spring is secured to another sleeve firmly connected with the wheel S, and having teeth on its circumference engaging a locking lever T.

A wheel U serves to wind the working springs—being in engagement with the toothed wheel S, and thus the other end of the spring R is wound by the sleeve.

The operation of the apparatus is as follows: After the springs are wound up, the times for lighting and extinguishing are determined, as the shafts H and I can, owing to the friction clutches, be turned independent of the clock-work G, and the hour-wheels L and M and the pointers are set according to the number of hours for which the



apparatus is to work. When the lighting pointer arrives at zero, the lug on the corresponding hour-wheel trips the latch lever so that the lug on the wheel Q in front is released, and the latter is rotated, by means of its spring R, until the next lug abuts against the other lever. The lugs are so disposed relative to one another that the one abuts against the upper lever and the other against the lower lever, and can thus only be checked thereby. If the wheel Q is provided (as shown) with two lugs—one for lighting and one for extinguishing—the shaft makes one-half rotation each time; if there are four such lugs, the shaft makes a quarter-rotation.

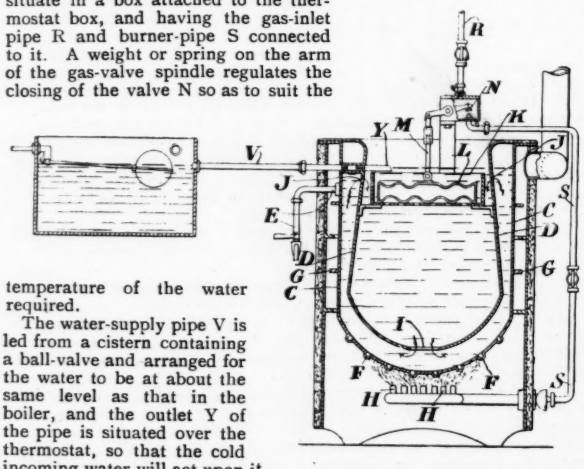
When the other pointer stands at zero, the other hour-wheel releases the other lever; and this again releases the lug of the wheel Q, which has been until then held stationary. The wheel makes a half-rotation until the lighting lug abuts against the other lever; and so on. If the time for lighting is to be set back just after the apparatus has affected the lighting, this is accomplished by turning the lighting hour-wheel until the pointer stands at the later time desired. The lug will then release the lighting lever when the pointer, after a short time, arrives at zero. But as lighting has already taken place, nothing happens, because an extinguishing lug of the wheel is in front of the extinguishing lever. Only when the extinguishing pointer comes to zero will the wheel Q be free to turn; "so that it is impossible for the times for lighting and extinguishing to be confused."

Water-Heater.—Glover, T., of Queen Victoria Street, E.C. No. 11,071; May 26, 1905.

This invention relates to apparatus for heating water of the class wherein, on a determined degree of heat of the water being obtained, the gas supply is shut off or lowered, and re-established when the water has cooled.

The outside casing of the heater is made of sheet metal, preferably packed with asbestos or other non-conductor of heat, to prevent radiation. Inside the casing is the boiler proper, formed from two cup-shaped bodies C D, closed together at the top; the outer one having the draw-off pipe E some little distance up from the bottom, and rivets or depressions F on the bottom or sides, or both, or baffles G, for creating a heating surface for the gas-flames from the burners H underneath. The inside body D is open at the bottom at I, and is provided with holes J near the top.

Inside the inner body D is a case K, carrying a thermostat L (preferably of the aneroid type), connected by an adjustable arm M to the valve N controlling the supply of gas to the burners. This valve is situate in a box attached to the thermostat box, and having the gas-inlet pipe R and burner-pipe S connected to it. A weight or spring on the arm of the gas-valve spindle regulates the closing of the valve N so as to suit the temperature of the water required.



The water-supply pipe V is led from a cistern containing a ball-valve and arranged for the water to be at about the same level as that in the boiler, and the outlet Y of the pipe is situated over the thermostat, so that the cold incoming water will act upon it.

In action, the cold water entering the thermostat box K acts on the thermostat L and causes it to contract; and, in consequence, by its rod M, to operate the gas-valve N and so establish a full gas supply. The water passes into the boiler out at the bottom of the inside body D and up between the two bodies D and C, and out again, through the holes J in the inner body, into the boiler, and so establishes a constant circulation—the heat of the gas-flame playing on the outer body of the boiler on passing to the flue or uptake X. When the water is heated to the desired degree, the heat of the water expands the thermostat, and this operates the valve N to shut off or reduce the supply of gas, and thus reduce the heating medium. On the drawing off of the hot water, the cold water will immediately begin to enter and act on the thermostat, which will re-establish the gas supply; and if the hot water is drawn off slowly, the cold water will be heated sufficiently in its travel through the apparatus to establish a constant supply of hot water at the draw-off tap.

APPLICATIONS FOR LETTERS PATENT.

9436.—Scott-Snell, C., "Incandescent burners." April 23.
9438.—Statter, J. G., "Gas-engines." April 23.
9439.—Martin, W. G., and Hasell, W. M., "Flexible gas-piping." April 23.
9452.—Townsend, W. W., "Valves." April 23.
9501.—Tait, G. M. S., "Combustible gaseous fuel for the generation of motive power." April 23.
9522.—Kent, W. G., "Registering apparatus." April 23.
9577.—Mundler, S., "Inverted burners and mantles." April 24.
9623.—Harrison, C. W., "Incandescent lamps." April 24.
9682.—Caldow, A., "Anti-vibrator." April 25.
9724.—Radcliffe, J., "Distillation of tar." April 26.
9755.—Potter, W. G., "Valves." April 26.
9773.—Holmes, E. D., "Extracting tar from gas." April 26.
9800.—Bécigneul, J. J. M., "Treatment of spent gas purifying materials for the extraction of sulphur." April 26.
9885.—Brooks, B. W., "Inverted burners." April 27.
9887.—Siemens Bros. and Co., Ltd., "Rotary gas-pumps." A communication from Siemens Schuckertwerke G. m. b. H. April 27.
9892.—Harrison, C. W., "Inverted lamps." April 27.
9930.—Lynde, F. C., "Regulating pressure of gas." April 28.
9982.—Lied, O. S., "Igniting and extinguishing devices for gas-burners." April 28.
9988.—Fairweather, W. C., "Gas-producers." A communication from G. Seyfarth and Sohn. April 28.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

The Question-Papers for the Gas Manufacture Examinations.

Sir,—In your last issue, you printed the questions set at the recent examinations in "Gas Manufacture" held by the City and Guilds of London Institute. If your readers look through them, and especially if they compare them with the official syllabus, they will be able to understand how strong and how widespread is the dissatisfaction and indignation that will shortly crystallize into a number of officially made complaints to the Institute.

The advent of a new Examiner is always liable to cause a difference in the general tone and style of an examination paper; and though, both to teachers aud students, this is occasionally disconcerting, still it is educationally wholesome, and often leads to ploughing across old ruts. Hence these examiners are changed, as a rule, every five years. As a teacher, and as an external Examiner who has marked papers of thousands of students, I should be slower than most to make complaints about an unexpected examination paper; but the present instance certainly presents special features which call for comment and remonstrance.

The most important point is the setting of questions in the ordinary grade on matters only mentioned in the syllabus for the honours grade—viz., Nos. 3, 5, 7, and 9. Doubt may arise, as in No. 2, as to whether the question does not go further into the matter than was

contemplated in the official syllabus; but no difference of opinion can exist as to questions on carburetted water gas, calorimetry, gas analysis, and holder construction, which subjects are definitely given in the honours grade syllabus and omitted from that of the ordinary grade. In the questions set in the honours grade, the same definiteness of complaint is not so easy, except in No. 10. This want of adherence to the syllabuses either supposes on the part of the Examiner a culpable neglect to make himself acquainted with them or a delibrate breach of faith with the students (and their teachers), who presented themselves for an examination in accordance with those syllabuses, &c. These are very strong terms; but after trying for several days to find a more charitable explanation, I am reduced to using them. One would have thought the provision of Consulting Examiners in addition to the acting one would have secured something more like continuity of purpose, and would have prevented the present false step.

Secondly, though it is well in making one's meaning very plain to avoid too much brevity, and though the plan of giving subdivisions to a question is a very commendable one, yet in the present case many of the questions really treat of several distinct subjects, each needing fairly full answers. Thus an unusually large amount of writing is necessitated. This, combined with the fact that many need a preliminary pondering over and working out, will probably have resulted in not a few students being unable to complete within the allotted time My first impression on seeing the paper was surprise at the unwonted length of the questions. I pick up at random the paper set in 1894. The ten questions of the ordinary grade are asked in 102 words. Here there are 72 in the first question; and the same contrast prevails in the honours grade.

Thirdly, such an examination paper apparently points to a misconception of the *raison d'être* of the Institute and its examinations, and certainly manifests an unduly exalted idea of the technical and general education of the average candidate. The very title of the Institute states that it is "for the advancement of technical education." The examinations are not a qualifying test for gas managerships, or how well it is that the test is not compulsory and retrospective. "Advancement of technical education" can only mean for the City and Guilds Institute the directing of studies and encouragement of class and home study. In this case their own directing is ignored, and discouragement spread abroad. During the past few days, I have been deeply touched at seeing how real and paralyzing has been this discouragement; and the result will be most serious among those who most need all the encouragement we can give them in their uphill work. Of recent years, many gratifying signs have been visible of awakening interest and ambition, and of the arousing of dormant powers. Gas manufacture classes have sprung up in many centres, the numbers who have taken the examinations have greatly increased—both class students and private students—and Junior Gas Associations have been formed all over the country. Those of us who have been working hard in these directions not unnaturally feel sore when we see—as we shall continue to see—the effect of such a staggering discouragement. This examination may be but a passing and unimportant event to examiners, and possibly even to teachers; but it looms large to the students concerned, and may determine the attitude of many towards study and technical equipment. Few, if any, of us would object to a stiff final examination in the highest stage of a technical subject, especially if it were divided into three or four stages; but it is to be remembered that many who take the ordinary grade examination find the present syllabus far too heavy for a session of 25 to 28 class nights.

Appended to the ordinary examination questions are those set for the students at the Regent Street (London) Polytechnic Class. Special interest attaches to this class for its fine pioneer work and its equally fine results. Technical classes in London are the only ones that can get any grants from the City and Guilds Institute; and it is singular that this class (in many respects the premier class in the country), with all London and the Home Counties to draw its students from, is plainly examined on a syllabus other than the official one. Surely this ought to create some doubts in the official mind as to whether the official syllabus is absolutely the best and most suitable one. Then, too, is the Examiner the same? If so, the disguising of one's handwriting, which is so difficult to most of us, is child's play compared with this brilliant success in disguising and differentiating his style of question. And not only style, but scope and difficulty are quite different in the two cases, as will be at once apparent to any one comparing the two sets. This difference is most flattering in its implied compliment to the powers and achievements of the young men of the Provinces. But, on the whole, they would prefer that they and their Metropolitan *confrères* should stand on the same footing before the examiners in Gas Manufacture, even as the latter also wish their gas to be subjected only to the same tests and restrictions as obtain in most other parts of the country.

Halifax, May 4, 1906. WM. CRANFIELD.

The Cheapest Gasholder.

SIR,—In the discussion on Mr. Nelson's paper on "Comparisons in Gasholder Design" (see "JOURNAL" for May 1), Mr. Hovey remarked that he believed "the cheapest gasholder ever constructed came to £5 per 1000 cubic feet." I presume he was referring to gasholders of the same capacity as those illustrated in the paper.

The cheapest gasholders (disregarding size) are Sir George Livesey's at the South Metropolitan Gas-Works, which work out at considerably under £5 per 1000 cubic feet. Mr. H. E. Jones has also designed some very cheap structures.

A gasholder I designed in 1893 for the Bournemouth Gas and Water Company cost less than £5 per 1000 cubic feet; and this one was only 150 feet diameter, having a capacity of about 1¾ millions. The guide-framing was carried to the full height, and had four tiers of girders.

Although a gasholder may be of light construction, it may be far stronger and more durable than many others of perhaps double the weight. In the one case, the material is properly disposed to resist the stresses, wear and tear, &c., and in the other it is lavished where not required, to the neglect of where it is.

Lightness is not the only essential feature for cheapening designs. Many engineers (so called) design structures practically unmakable in the workshops, or which cause unnecessary trouble and difficulty in manufacture and design. In fact, a good design makes for cheapness quite as much as mere saving in weight. Every practical engineer knows that one can design something very light, and yet extremely expensive. There is a tendency to make weight alone the criterion of cost, which is a mistake.

71, *King William Street, E.C., May* 3, 1906. F. S. CRIPPS.

Working of Retort-House Governors.

SIR,—I should be glad if you would find space for the following remarks in answer to Mr. Helps's letter in your issue of April 24, in which he expresses doubt as to the accuracy of several statements contained in the paper, on the "Working of Retort-House Governors," which I read recently before the Midland Junior Gas Engineering Association. I will deal with the various points in the order in which Mr. Helps raises them in his letter.

(1) Mr. Helps finds difficulty in accepting my statement that with a retort-house governor, working properly, a gauge-glass connected to the hydraulic main will show very little or no effect when the retort-lids are closed after charging. He says it is his experience that a marked difference on the gauge is made; but he does not say if a retort-house governor was being used when he observed such difference. If this were not the case, the variation on the gauge is only what might be expected.

(2) I stated in my paper that, providing the ascension-pipes are of sufficient area and are kept clear, the pressure in the retorts should not at any time rise appreciably above that of the atmosphere, even when the gas is being given off at the maximum rate; and that it is only by the help of a retort-house governor that these conditions become practicable. Mr. Helps denies that the retort-house governor, *per se*, can have anything to do with keeping constant atmospheric pressure in the retorts; and he says that a regular pull on the hydraulic main, if the connections are ample, can be maintained without the use of such a governor. I find it difficult to reconcile the latter statement with Mr. Helps's previous assertion that a marked variation on a gauge connected to the hydraulic main is made when the retort-lids are closed after charging.

In support of my contentions, I may say that I have been able to detect, after charging, no appreciable variation on a water-gauge connected to the governor inlet; and no such variations can be traced on any of the diagrams which illustrated my paper. Also, it seems to me that a sensitive governor situated on the foul-main in close proximity to the hydraulic, will more surely and quickly neutralize any tendency to a rise of pressure in the hydraulic main than could an exhauster governor on the other side of the condensers and acting through the engine.

(3) and (4) Mr. Helps cannot accept my statements as to the yield and quality of gas produced at Stafford during the previous year, before and after the introduction of the governors, and which showed an increase of over 500 cubic feet per ton and half-a-candle in quality, due to their introduction. The carbonizing results for the financial year ending March 31 fully bear out these figures as regards the make; and the illuminating power has been obtained by averaging all the tests made—the tests being made indiscriminately at all hours. Mr. Helps contends that it is impossible to produce from ordinary Staffordshire coals 12,000 cubic feet of 16·1-candle gas (my figures for the portion of the year after the installation of the governors being over 12,000 cubic feet of 16·1-candle gas), even with a dry main.

I may say that, using the same coals as were employed in the retort-house to obtain these figures, far higher candle-feet results have invariably been obtained at Stafford in a small test plant in which it is easy to maintain very favourable conditions for carbonization, and in which plant these results can be repeated at will. There is no reason why approximately as good results should not be obtained on the large scale as in a small test plant, if it were possible to ensure, on the large scale, equally good conditions for carbonization. The retort-house governor maintaining approximately a level gauge in the hydraulic, combined with little or no seal, is a step towards such good conditions.

(5) Mr. Helps states that it is impossible for any governor to act in such a way that, at or near the hydraulic main, there can be no oscillation, or even so little as my Diagram No. 3 showed (a maximum variation of perhaps 2-10ths), with the liquid in the hydraulic main flush with the bottoms of the dips. It is possible that the governor might not entirely prevent as much oscillation as Mr. Helps thinks there would be under these conditions; but in my opinion there would be very little oscillation to prevent, and the diagram truthfully represents the conditions in the hydraulic over the whole 24 hours and at a period of fairly heavy make. Mr. Helps then tries to show what amount of oscillation there would be with a 6-inch round dip-pipe, and starts by taking its sectional area as 36 square inches. He next assumes that, when the maximum amount of gas was passing down the pipe, it would require this amount of area under the bottom edge of the dip in order to escape, with the result that the water underneath would be depressed 2 inches [2 in. × 18 in. (circumference) = 36 sq. in. (area)]. Mr. Helps says that the liquid would be alternately forced down 2 inches, then, jumping up, seal the dip, and so cause the oscillation.

I would suggest that, in any case, Mr. Helps has based his calculation wrongly. He has assumed that the gas would travel at the same speed down the dip and under the edge. It seems to me that, even with an approximately level gauge in the hydraulic main, if the liquid were flush with the bottoms of the dips, there would be either a slight suction in the hydraulic main or a slight pressure in the dip-pipe—in either case just sufficient to cause the speed of the gas to be greatly accelerated as it passed under the bottom edge of the dip, and thus require less area than that of the dip-pipe. I think it unreasonable to suppose that the gas would issue at sufficient pressure to make a depression in the liquid 2 inches deep. There might be a very slight depression and rising, but not enough, in my opinion, to cause oscillation to any appreciable extent.

I was interested to read the remarks contained in the letter written by Mr. Cripps to Messrs. Parkinson and W. & B. Cowan, a copy of

which he appended to his letter appearing in the last number of the "JOURNAL." I think that, in the main, his remarks are in agreement with what I stated in my paper concerning the working of the governors, but should consider that he lays perhaps too much stress on the necessity of exercising suction in the ascension-pipes of retorts even if giving off gas at the maximum rate. If suction be exercised in a clear ascension-pipe of ample area, it would very likely extend itself to the retort. He advocates the use of some sealing arrangement for retorts, while being drawn and charged. If approximately atmospheric pressure be maintained in the hydraulic main, there will be no real necessity for such an arrangement, which would in any case be a complication and require attendance.

Stafford, May 4, 1906. LESLIE WILSON.

Coal Conservation, Power Transmission, Smoke Prevention.

SIR,—Your foot-note to my letter, printed in your issue of the 24th ult., begins as follows: "It is not surprising that Mr. Martin in his letter makes no attempt whatever to controvert what we stated to be the fundamental fallacy underlying his paper and all such similar speculations. That fallacy consists in taking present raw materials, assuming the continued increase in their demand and necessity under future unknown conditions, and thus drawing erroneous and supposititious deductions as to their exhaustion and its calamitous effect." If, as you say, I have failed to meet your previous criticism, it is solely because it did not appear to me that you had shown that my deductions as to the exhaustion of our coal supplies were either erroneous or supposititious. Not to argue the point *ad infinitum*, I will simply quote the deductions in question, and leave your readers to judge for themselves whether they warrant the construction which you place on them—"That they will not be exhausted in any such period is obvious;" "they" being our coal resources, and the period referred to, that which would be required for their exhaustion if the present rate of increase in consumption continued. "The sudden exhaustion of our coal-mines is, for the reason given above, a practical impossibility."

"The present rate of increase in putting motor omnibuses on our roads" is not quite on all-fours with that in the consumption of coal. If the latter were now coming into use for the first time as a substitute for some other fuel, I grant you that there would be no ground for expecting the rate of increase which prevailed under such conditions to be maintained for long. But it cannot be seriously contended that coal is on such a footing; and the returns for the past 34 years, given in Table D of the Commissioners' final report, lend no support to the view that the present rate of increase in consumption is either transient or exceptional.

You complain that, while drawing attention to the steady increase in the demand for coal, I do not take into account the Commissioners' warning of an impending falling off in the supply. How far this complaint is justified may be seen from a comparison of the passage in the Commissioners' final report containing the warning question, and of one of the passages in my paper which deals with the same point. The Commissioners say: "In view of this opinion"—that of the District Commissioners—"and of the exhaustion of the shallower collieries, we look forward to a time, *not far distant*, when the rate of increase of output will be slower, to be followed by a period of stationary output, and then a gradual decline." My own words are: "What is practically certain is that at no very distant date a cheap and abundant supply of coal, such as we enjoy to-day, will have become a thing of the past." The words which I have italicized in the extract from the report hardly justify your conclusion that the shrinkage in our coal supply is a "far-off and unpractical" question, which does not concern the present generation.

Your remarks on this part of my paper are coloured throughout by your assumption that I have assumed "that the present rate of increase in the output of coal can long continue." The construction thus placed on my paper is not only not warranted by anything which it contains, but is in direct defiance of my statement that "the pressure of the demand upon the supply, and the exhaustion of the beds which are most easily worked, will bring about a rise in price which will act as a powerful brake upon consumption." This brake may, on the one hand, be allowed to come on gradually, by the adoption of well-tried methods of economizing coal before the pinch of the diminishing output is felt by the general body of consumers; but, on the other hand, it is within the bounds of probability, especially if those who deny the need for conserving our coal supplies have their way, that nothing short of a coal famine, with its attendant distress and dislocation of industry, will serve to bring about the displacement of the wasteful methods now in vogue.

While I thus indicate the consequences which different lines of action are calculated to bring about, I do not think that your persistent attempts to convict me of prophecy are justified by any unsupported assertion on my part as to what will take place.

May I suggest that the difficulties which my paper appears to present to you, and the fallacies which you find in it, would vanish together if, in dealing with it, you would observe the same regard for context upon which you very properly insist in connection with the reports of the Royal Commission?

You refer somewhat sarcastically to the fact that I do not fall in with your suggestion to expropriate the London Gas Companies. I am aware that there is in some quarters a strong desire to take their undertakings out of their hands; and if they are really not competent to exercise "the inestimable privilege of distributing" gas, whether town-made or colliery-made, it may be desirable to do so. It does not, however, appear to me that the removal of the process of gas manufacture to the coalfields, whether it be undertaken by the present Companies or by an allied Company, would constitute any valid reason for displacing the former from the position which they have so long occupied with credit to themselves and benefit to the community. Nor is it usual, so far as I am aware, to pay a purchase price for an undertaking which remains in the hands of the owners and is used by them either wholly or in part.

In characterizing as a "charming instance" of "inconsequent reasoning" my reply to your remarks as to the influence of cheaper gas on coal conservation, you have fallen into a slight inaccuracy. The point in question was not whether more coal would be used for gas making, but whether the cheapening of gas would lead to a reduction in the consumption of coal—in your own words, "Will coal be conserved?" This is borne out by the passage in your former article, of which you reproduce a portion, and of which the full text is as follows: "For if such a scheme did affect any cheapening in the sales of gas (which it would not), this would obviously increase the demand, and so augment the consumption of coal *and expedite the prophesied evil day of its exhaustion*." It is hard to see how the words which I have italicized can be justified, except on the hypothesis that the cheapening of gas will not result in its extended use in substitution for coal.

While, as you say, "The Royal Commission did not (specifically) recommend the transmission of coal gas to London from South Yorkshire collieries," they nevertheless reported as follows: "The evidence points to a future extension of central power stations, and the generation and transmission of power upon a large scale. If such stations were established in close proximity to the collieries, there would be nothing to pay on the coal in the way of railway rates; and the question would then be, not the cost of transport of coal, but the cost of transmission of power." Some of the witnesses, whose opinions cannot be summarily brushed aside, were more specific in their recommendations; one of them, Professor Burstall, going so far as to show that Mond gas for power purposes could be conveyed in a 48-inch main to a distance of 196 miles with an efficiency of 81·5 per cent. Mr. B. H. Thwaite has outlined a project for transmitting electrical energy from the South Yorkshire coalfields to the Metropolis, supplying the principal towns in the Midlands *en route*. It will be seen that, both as regards the distance covered and the size of main employed, my proposals are well within those which have actually been made to the Commissioners; while even as regards the locality from which power is to be transmitted, I have been anticipated by Mr. Thwaite.

There remains the selection of the medium for transmission. But even as to this I doubt whether a claim of originality on my part would be allowed to go unchallenged.

You are emphatic in denouncing my proposals as impracticable. If my figures are utterly unreliable, and if the experience of American engineers in the transmission of natural gas under high pressure to distances of 300 miles, and of manufactured gas for 35 miles, is to be dismissed as a figment of the imagination, by all means let the field of long-distance transmission be relinquished to Mond gas and electricity. Until proof of this is forthcoming, one may be permitted to continue to believe that in this field, as in others, coal gas is able to hold its own against its rivals.

I am glad to learn that you agree with some points in my paper; and I trust that I do not flatter myself too much in believing that, had the ability which has been shown in finding matter for disagreement with it been expended in seeking points for agreement, your article would have worn a different complexion.

7, *Victoria Street, S.W., May* 4, 1906. ARTHUR J. MARTIN.

[We do not think that any useful purpose will be served by a prolongation of this discussion; and we therefore content ourselves with the following quotation from Mr. Martin's paper, which answers some of the points raised in the above letter: "If the consumption [of coal] should continue to increase at the same rate [as from the year 1870 to 1904], a simple calculation shows that the supply in the proved coalfields would last just over a century—to be exact, to the autumn of 2012."

We must also point out (though it can hardly be necessary) that it was not our suggestion, as Mr. Martin states, "to expropriate the London Gas Companies." We merely drew attention to the fact that someone else wanted to expropriate them without paying for the privilege—a slight omission which Mr. Martin admitted on the curiously irrelevant and inconsequential ground that the Metropolitan Gas Supply could not be better distributed than at present.

Finally, we did not say that "the shrinkage in our coal supply is a 'far-off and unpractical' question;" and the tearing out of a qualifying phrase and applying, or mis-applying it, to a different substantive altogether, is perhaps hardly legitimate, even in a controversy of so prophetic and illusory a kind as this. What we did say, and what, in conclusion, we repeat, is that "the common-sense Britisher need not worry, and does not, about such far-off and unpractical questions as to how future generations will look after themselves."—ED. J.G.L.]

Liverpool Gas-Fittings Company, Limited.—At the annual meeting of the shareholders of this Company to-day, the Directors will report a net profit of £1364 on the working in the twelve months ending the 31st of March. Adding the balance of £249 brought forward, the e will be £1613 to the credit of the profit and loss account. The Directors recommend that a dividend of 10 per cent. should be declared, with a bonus of 1s. per share, free of income-tax.

Gas and Electricity at Colchester.—A recommendation of the Lighting Committee, that the Borough Surveyor at once fit up fifty of the public gas-lamps with incandescent burners and fittings (at a cost of £32 18s. 4d., or 13s. 2d. per lamp), led to some debate in the Colchester Town Council. Alderman Sanders expressed a hope that before long they might convert gas-lamps into electric lights at less cost than at present. The Committee were, he said, keeping an eye on every really workable improvement. They were, however, giving the public the best possible light at the least possible cost. He believed that if the whole town were lit with electricity, it would be cheaper in the end; but at present the conversion of each lamp into an electric light cost £4 10s. Where, he asked, was the capital to come from if they converted 1000 lamps? He claimed that the Lighting Committee had been doing the best they could under very difficult circumstances. The report was adopted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Bacup Corporation Bill, Cardiff Gas Bill, Carlisle Corporation Bill, Gas Companies (Removal of Sulphur Restrictions) Bill, New Mills Urban District Council Bill, North-East Lincolnshire Water Bill, Thornton Urban District Gas Bill, Todmorden Corporation Bill, and Uxbridge Gas Bill.

Bills read a second time and committed: Dowlais Gas Bill, Epsom and Ewell Gas Bill, Merthyr Tydfil Gas Bill, and Watford Gas Bill.

Bill reported, with amendments: Bury Corporation Bill.

Four Bills to confirm Provisional Orders relating to gas and water supply—viz., Gas Orders Confirmation Bills (Nos. 1 and 2), Gas and Water Orders Confirmation Bill, and Water Orders Confirmation Bill—have been presented and read the first time. No. 1 Bill contains Orders relating to Charing, Chichester, Corsham, Farnham, and King's Lynn; No. 2, Orders relating to Newport Pagnell, Pontardulais, Raunds, Redditch, and St. Austell; and the Gas and Water Orders Bill, Orders relating to Bolsover and district, Great Grimsby, Hoylake and West Kirby, Wath-upon-Dearne and district, and Wollaston. The Water Orders Bill contains Orders relating to Herne Bay, Maidstone, Mid Kent, Rickmansworth and Uxbridge Valley, Sleaford and district, and Slough.

Petitions have been presented against the Epsom and Ewell Gas Bill by the Redhill Gas Company, against the Huddersfield Corporation Bill by the Longwood Gas Company and the West Riding Rivers Board, and against the Uxbridge Gas Bill by the Metropolitan Railway Company.

The opposition to the Crediton Lighting and Power Bill and the Truro Gas Bill has been withdrawn.

HOUSE OF COMMONS.

The Quality of London Water.

On Monday last week, Mr. Bottomley, the Member for South Hackney, asked the President of the Local Government Board whether his attention had been called to the quality of the drinking water supplied to London, and particularly to the fact that the inhabitants of East London are daily drinking as water some 2 million gallons of sewage effluent; and what steps he proposed to take in the matter. Mr. Burns said his attention had been called to the subject referred to. He was aware that it was desirable that further steps should be taken to safeguard the supply of water from the River Lea from the possibility of contamination. The Metropolitan Water Board included in a Bill promoted by them this session proposals with this object; but they had, as he understood, withdrawn this part of the Bill, and he was in communication with them in relation to the matter. He might, however, state that he learnt from the Water Examiner that the water supplied in the East London district during the past winter (consisting mainly of filtered Lea water) was clear and of good quality.

On Thursday, Mr. Straus, the Member for Mile End, asked the President of the Local Government Board whether, with the view of improving the London water supplies, he would consider the advisability of compelling, by legislation or otherwise, the use of the process now in existence which was capable of dealing satisfactorily with contaminated water by completely destroying all pathogenic bacteria remaining in the supply after sand filtration. Mr. Burns, in reply, said he was not sure as to the particular process referred to. The Metropolitan Water Board had before them the question of the research work to be undertaken with a view to determining whether the present system of purification of the London water could not be still further improved; and every practicable means of obtaining the best results would, no doubt, be thoroughly investigated. The matter did not appear to him to be one for compulsory action, by legislation or otherwise, at the present time.

The following further progress has been made with Bills:—

Bills reported: Gas Companies (Removal of Sulphur Restrictions) Bill, Mid-Oxfordshire Gas Bill [preamble not proved], Peterborough Gas Bill, Rochester, Chatham, and Strood Gas Bill, South Metropolitan Gas Bill [parties do not proceed], Wandsworth and Putney Gas (Removal of Sulphur Restrictions) Bill [parties do not proceed].

Bills read the third time and passed: Gas Companies (Removal of Sulphur Restrictions) Bill, Kidderminster Gas Bill.

The Standing Orders Committee having reported that the promoters of the Sutton District Water Bill, the object of which has already been indicated, should be allowed to proceed, it has been presented and read the first time.

Two Bills to confirm Provisional Orders in respect of gas and water supply—viz., the Local Government Provisional Orders (Gas) Bill, relating to Arlecdon and Frizington, Liverpool, and Marsden, and the Poole Water Provisional Order Bill—have been presented and read the first time.

The Heacham Water Bill, Manchester Corporation Bill, Shrewsbury Corporation Water Bill, and South Lincolnshire Water Bill have been referred to a Select Committee, consisting of Mr. Mooney (Chairman), Mr. Alden, Mr. Bowles, and Mr. Hall; to commence sitting to-day.

The petitions presented against the South Suburban Gas Bill by the Camberwell and Lewisham Borough Councils and the Penge Urban District Council have been withdrawn. The Bill has therefore been withdrawn from the group in which it was included, and referred to the Committee on Unopposed Bills.

REMOVAL OF SULPHUR RESTRICTIONS BILL.

House of Commons Committee.—Monday, April 30.

(*Before Mr.* F. CAWLEY, *Chairman, Mr.* COGAN, *Mr.* ROWLAND HUNT, *and Mr.* DUDLEY WARD.)

The proceedings on the above-named Bill were briefly recorded last week (p. 321), but may be more fully reported to-day.

Mr. ERNEST MOON, K.C., and Mr. C. C. HUTCHINSON appeared for the promoters; Mr. HONORATUS LLOYD, K.C., and Mr. E. SHORTT represented the Newcastle-on-Tyne Corporation.

Professor *Percy F. Frankland*, who also gave evidence before the Departmental Committee, was the first witness called to continue the evidence on behalf of the Corporation. He said that when gas containing sulphur was burned, damage was done to furniture, books, &c.; in fact, he had materials which had been ruined in this way. He had found in a small house, such as might be occupied by a clerk or a working man, that about 20,000 cubic feet of gas were consumed in a year. If this contained 8 or 10 grains of sulphur per 100 cubic feet, 104 grammes of sulphur would be discharged into the house in the course of a twelvemonth. But if the sulphur went up to 40 grains, 1·15 lbs. of it would be discharged into a house in which only 20,000 cubic feet of gas per annum were burnt. In such a house there would be (say) five incandescent burners in use; but he could not say how many rooms there were.

The CHAIRMAN remarked that the average did not amount to much, if the witness could not say how many burners were in use in a certain space. It was somewhat indefinite, so far as scientific evidence was concerned.

In cross-examination, Mr. HUTCHINSON drew attention to the possibility that but a small amount of the products of combustion of the gas escaped into the air.

The CHAIRMAN (to witness): How many grains per 100 cubic feet do you consider unpleasant?

Witness: I object to gas as an illuminant, because any sulphur is objectionable. If the room is well ventilated, it is possible not to detect any unpleasantness from the gas.

If you went into a room that was not ventilated, could you say whether there were only 10 grains or 60 grains?—It would depend on how long the gas had been burning; but I feel sure I could detect that difference.

Do you consider that 1·15 lbs. of sulphur burnt in a house such as the one referred to, would be deleterious to health?—I should think the constant breathing of an irritating gas like sulphurous acid would be deleterious to people when confined to such an atmosphere regularly for long periods.

Dr. *Armstrong*, the Medical Officer of Health for Newcastle, said, with regard to the effect of gas upon books, instruments, and materials, he found that the sulphur was very destructive, and it also had a corrosive effect upon metals, picture-frames, and the like. He had examined rooms in which experiments had been made by Mr. Pattinson; and in one of them gas had been burnt containing about 8 grains of sulphur per 100 cubic feet. For two hours, three Bray burners were going; the only aperture being the flue of an open fireplace. There was no noticeable smell or flavour of sulphurous acid. In another room, 30·3 cubic feet of gas were burnt, containing 48 grains of sulphur per 100 cubic feet. In this room, the flavour of sulphurous acid was quite distinct, especially in the upper part. Asked if he thought such a nuisance as there was from spent lime was as injurious as that from the larger amount of sulphur in the gas, he said he should think by no means so much, as the one was occasional and local in the open air, whereas the other was constant. He had taken out a list of the tenements of one, two, and three rooms respectively in Newcastle. Perhaps half of them were lighted by gas, the use of which had increased very much of late years owing to the penny-in-the-slot arrangement. Ordinary flat-flame burners were being replaced to a large extent; but they were much used by the poorer people, for whom incandescent burners were somewhat expensive and troublesome.

Mr. *W. J. A. Butterfield* said that sulphur in gas was generally disagreeable to persons in gas-lighted rooms. From observations he had made, he was satisfied that the action upon metals of sulphur products from the burning of gas increased very rapidly with the increase in the amount of sulphur in the gas. He had had inverted incandescent gas-burners under observation in the district of one of the South London Gas Companies where lime purification had been abolished for two years, and he had also observed similar burners in the district of the Gaslight and Coke Company, where, until recently, this method of purification had been in use. In the case of the Company in the South of London, the three burners had been fixed for eleven months, and had been used for very nearly 1200 burning hours, There was much incrustation upon the metal work of these burners; and he estimated that in one case there were 3·6 grains of sulphuric acid in it. As to the burner in the Gaslight and Coke Company's district, it had been fixed six months longer than the other, but had only been used about the same number of burning hours. The life of that burner he should estimate at about ten years, whereas in the other case the burner would be destroyed in about three years.

The CHAIRMAN expressed his dissatisfaction with this illustration, by which, he said, the Committee could learn nothing. The tests showed that the sulphur had not been high since the restrictions had been removed in the case of the gas consumed in the Gaslight and Coke Company's district; and the daily tests revealed the fact that it had seldom, if ever, exceeded 20 grains per 100 cubic feet.

Mr. SHORTT endeavoured to explain to the Committee how long the burners had been in use, and how long the restrictions had been done away with in each case.

The CHAIRMAN, however, said the Committee could not remember all these things.

Mr. SHORTT (to witness): I think you took the average and the maximum at the four testing-places—Stoney Lane, Bedford Road, Lewisham Road, and Burrage Road?

Witness: Yes. During the first three months of 1905, when the

restrictions were in force, the average sulphur in the gas was 13·2 grains per 100 cubic feet. After the removal of the restrictions, in the first three months of this year the average had risen to 41·8 grains. The maximum when the restrictions were in force was 20·7 grains; and the maximum after their removal, 78·5 grains.

Examination continued: In regard to English towns, very few stand upon the same footing as Newcastle. Of the London Gas Companies, the South Metropolitan is the only Company manufacturing simply coal gas; and of the Suburban Gas Companies, the South Suburban Company is, I think, the only one. The other Metropolitan Gas Companies, and most of those in the Provinces, make a considerable portion of carburetted water gas, the admixture of which automatically reduces the quantity of sulphur in the gas distributed to the consumers. In the districts where there is much carburetted water gas, it is not so essential that purification by lime should be used. Tables were put before the Departmental Committee, which I find were incomplete, showing that 69 per cent. of the total output of gas burnt in England and Wales had the amount of sulphur impurities voluntarily kept within limits or under restrictions. But some towns were not included where I know lime purification was in use; two of them being Croydon and Oxford. So that the percentage of gas either under restriction or dealt with by lime at the time the Departmental Committee were sitting, was more than 70 per cent. of the total in England and Wales. With regard to Continental towns, it was represented before that Committee that, except in five, which were named, the proportion of sulphur was regarded as quite unimportant. But, actually, the sulphur in very few, if any, towns on the Continent would rise to the same amount as in districts where coal gas only is made.

The CHAIRMAN: Do they use lime?

Witness: In a few cases. Where they do not, the amount of sulphur is low. At the Berlin Municipal Gas-Works, the official report for the year 1902 gives the average of 20·6 grains per 100 cubic feet. At Cologne, the average is 21·5 grains; at Zurich, 17¾ grains; and at Leyden, 20·5 grains.

Mr. SHORTT: The German coal yields considerably less sulphur than the Durham coal?

Witness: Yes. As a rule, gas made from German coal would not contain more than 20 grains of sulphur per 100 cubic feet; and therefore lime purification is not generally considered there.

I think you have also made inquiries in Holland?—Yes. In regard to Dutch gas-works, some carbonize English and others German coal. I have a list of the carbonizing results at Dutch gas-works, and in only 33 towns are the purifying materials named. In 24 of them, oxide of iron only is employed; but those works carbonize 254,000 tons of German, and only 154,000 tons of English coal. There are eight towns where 12,000 tons of English and 1300 tons of German coal are carbonized; and there they use lime only.

Where there is a large preponderance of German coal, they use oxide of iron; but where there is a large preponderance of English coal, they use lime?—Yes. I think they recognize that where English coal is carbonized, it is desirable, if not necessary, to employ lime.

Have you also gone into the question of the cost of manufacture, and inquired how the abolition of lime would effect it?—The abolition of lime purification should give a direct saving of ½d. per 1000 cubic feet of gas. Further, there would be an increase in the volume of saleable gas obtained per ton of coal carbonized of nearly 2 per cent., owing to the carbonic acid which is absorbed by lime, but not by oxide of iron. This extra 2 per cent. must be valued to the works at the manufacturing cost of gas—say 1s. per 1000 cubic feet. Therefore it is worth about ¼d. to the gas-works in respect of every 1000 cubic feet of gas made.

Has this 2 per cent. any illuminating power at all?—No; and it has no calorific value. It deteriorates the value of the gas for both illuminating and heating purposes in more than a degree proportionate to its volume.

This gas, therefore, is worth less to the consumer than that which is produced where there is lime purification?—Yes. I estimate that, apart from the extra sulphur impurity, the gas which has not been subjected to lime purification is worth, all round, for all purposes of lighting by flat-flame burners, incandescent lighting, or heating, not so much to the consumer as lime-purified gas by at least 1d. per 1000 cubic feet.

The CHAIRMAN: Do I understand that you would allow a certain amount of sulphur—say, 30 or 40 grains—but would not allow 60 or 70 grains?

Witness: Yes. I think some restriction is necessary, even if lime purification is abolished.

At what point would you say—20, 30, 40, or 50 grains?—If lime purification is to be abolished, it must not be fixed lower than 40 grains; and I should prefer that a maximum of 50 grains were allowed, provided the average were (say) under 35 grains, so as not to penalize the company for an occasional excess.

The CHAIRMAN: Would you accept that Mr. Moon?

Mr. MOON: We could not accept it.

Not accept the Bill under those conditions at once?—We could not accept it, because it would be impossible, if we did, to do away with the use of lime purification.

Not by using more carburetted water gas? You only use 1 per cent.—I think the average is 6 per cent. It went up to 20 per cent. and sometimes was only 1 per cent.

This closed the evidence in opposition to the Bill.

Mr. MOON, addressing the Committee, pointed out that it was only in respect of one portion of the Bill—that was to say, two of the Gas Companies named in the schedule—that there was any opposition to it as it stood. The Committee had indicated that there was a certain matter which required discussion, because whereas Sir George Livesey had stated to the Departmental Committee that there would be an average of 35 grains, and a maximum of 40 grains, of sulphur in 100 cubic feet of gas, results had shown that his estimate was not accurate. Of course, there were really two questions. First of all, were the results which had been ascertained up to the present time such as would be called normal, or were they abnormal from some cause or other, and would they expect in future to find that the results of the testing showed a less content of sulphur in the gas? The second question was whether, even if the amount contained in gas according to the present test was normal, anyone was going back upon the decision of the Departmental Committee? There was no evidence forthcoming that any bad result had ensued from the use of gas containing as much sulphur as the normal quantity contained in gas which was burnt, and which, according to the assumption of the Newcastle Corporation, was 42 grains. It was not a revolutionary proposal that the Gas Companies promoting the Bill were making to Parliament. Nothing that they would do by the Bill would prevent the Newcastle Corporation from ascertaining how much sulphur was contained in their gas in the future. It would, however, take away the penalty which gas companies were now under if they infringed in the least degree the standard that had been set up.

After a short deliberation in private,

The CHAIRMAN announced that the Committee were unanimously of opinion that the preamble of the Bill had been proved.

Mr. COOPER (the Parliamentary Agent for the Bill) said he ought to say that there was a clause with respect to the Wandsworth and Putney Gas Company which had been agreed with the London County Council and the Wandsworth Borough Council, and would have to go into the Bill, as the Wandsworth and Putney Gas Company's separate Bill had been withdrawn. But this clause would be added in the other House.

The clauses were then adjusted, and the Bill ordered to be reported.

METROPOLITAN GAS COMPANIES' BILLS.

The Select Committee of the House of Commons of which Major Seely is Chairman, met on Thursday to give consideration to a group of Bills containing the South Suburban Gas Bill and the South Metropolitan Gas Bill. It was announced, however, that there was no opposition to these Bills, and therefore they would be allowed to proceed in the ordinary course. It was subsequently reported to the House that the latter Bill would not be proceeded with.

PONTEFRACT CORPORATION BILL.

Police and Sanitary Committee—House of Commons.—Tuesday, May 1.

(Mr. J. W. WILSON, *Chairman.*)

This was an omnibus Bill promoted by the Pontefract Corporation, and, among other matters, deals with the question of the supply of water to the workhouse and the purchase of the undertaking of the Pontefract Gas Company.

Mr. WEDDERBURN, K.C., and Mr. F. N. KEEN appeared for the promoters; Mr. FORBES LANKESTER and Mr. R. S. CLEASE represented the Pontefract Gas Company.

Mr. WEDDERBURN, on reaching the point dealing with the question of water supply, said that clause 24 was as follows: "Notwithstanding anything in the Act of 1869, or any other Act or Acts, to the contrary, the several rates which the Corporation are authorized to charge for the supply of water for domestic purposes shall not be deemed to include or cover the supply of water for any fixed baths, and the Corporation may charge in respect of every fixed bath a rate not exceeding 7s. 6d. per annum." He remarked that, under existing Acts, the Corporation were bound to supply one fixed bath free of charge.

Mr. *W. Haddock*, the Town Clerk of Pontefract, said that they had always been paid for putting in a bath until a year ago, when several people refused to pay, and now nobody would pay.

The CHAIRMAN, after some discussion, in which it was stated that it was a common practice to make a charge, gave his casting vote in favour of the clause.

THE SUPPLY OF WATER TO THE WORKHOUSE.

Mr. WEDDERBURN said that clause 25, which was opposed by the Pontefract Board of Guardians, was as follows: "Notwithstanding anything in the Act of 1869, or any other Act or Acts, to the contrary, the supply of water by the Corporation for domestic purposes shall not be deemed to include a supply for all or any of the purposes of any workhouse, hospital, lunatic asylum, institution, or other large building; and the Act of 1869 shall be read and construed accordingly." He was prepared to meet them in a matter of drafting in order to make it compellable that the Corporation should supply the Guardians. But the real question was whether the workhouse should be supplied upon its annual value or by meter. The Pontefract workhouse was a large place; and it covered 33 townships. Prior to 1897, the Corporation supplied the workhouse at an agreed sum; but in that year the Guardians said they would prefer to be supplied by meter, and the Corporation supplied them at the same price at which they charged manufacturers. The result was that, owing apparently to the reckless use of water, the charge rose to £360 a year. The Guardians then awoke to the fact that, by a decision of the Divisional Courts, it had been held that the inhabitants of a workhouse were to be regarded in law as one family, and that therefore a supply to a workhouse was a domestic supply, and was not differentiated from the general law. Therefore, they said: "We decline to be supplied any more by meter, and you will supply us in future by annual value." The hardship was that the workhouse had increased in size to something like four times what it originally was; they had got electric light works and a very large steam laundry. The Guardians realized that they probably could not contend that the Corporation ought to supply on the annual value for the electric lighting works, and possibly for the steam laundry; and an arrangement was made that they should pay £120 a year, and pay on the annual value for any additions to the workhouse. The meters were left in the workhouse; and they had ascertained that the present consumption was at the rate of 60 gallons per head per day, which was absolutely abnormal. He strongly condemned this "non-economy of water," and said that at the Barracks in the town the consumption was only 15 gallons per head.

Mr. BOYCE said it was the wish of the Local Government Board that this clause should be fully gone into, so that it might form a precedent, not only as affecting workhouses, but all other public institutions.

Mr. WEDDERBURN submitted that the cost of supplying the workhouse at a smaller rate should fall on the whole Union, and not alone upon Pontefract.

The CHAIRMAN said the Committee would go into the question as a principle, and not so much with regard to waste, because the Corporation could take steps under their own Acts to stop the waste.

A good deal of local evidence having been taken, the Committee considered in private.

The CHAIRMAN said the Committee did not consider that this case of Pontefract in many aspects did raise the wider issue on which they could decide, or in any way make a precedent, by their decision in the case. For instance, there were peculiar powers under their local Acts, which, in this case, had enabled the Corporation to make a better bargain possibly with the workhouse under their Acts than might be possible under many other Water Acts. There was nothing in the evidence to make the Committee feel that there were any features in the case which would induce the Committee to depart from, or make any exception to, the general rule for supplying water for domestic purposes in so far as the domestic section of the workhouse was concerned. Therefore, the Committee had decided to strike out the clause. They unanimously wished it to be clearly understood that this was not to be regarded as a precedent, and quoted in cases where the circumstances were not the same.

THE TRANSFER OF THE GAS UNDERTAKING.

Mr. WEDDERBURN then opened the gas portion of the Bill. He said that the measure provided for the transfer of the Gas Company's undertaking to the Corporation, upon payment of a reasonable sum to be determined by arbitration. He read correspondence which showed that efforts to arrive at an agreement had been unsuccessful.

Mr. LANKESTER remarked that that was because the shareholders refused to sell.

Mr. WEDDERBURN said the Company was incorporated in 1873. Its capital was: Total share capital authorized, £32,000; loan capital authorized, £8000 (of which £5000 had been lent on mortgage); and there was a sum due to the bank of £2200. The result was that the net amount of income that they wanted to meet the interest and the maximum dividends was £2958. The Company had from the first paid their maximum dividends—there were no back-dividends. Therefore, it could not be said that it was a hard case—that they were emerging from a hard struggle in their early youth. The price of gas had been reduced from 3s. 3d. to 2s. 11d. net; but this was a high price for a Yorkshire town. The buildings they had erected were larger than were necessary. Among the instances he gave of the Company's alleged extravagance was that they had 79 retorts, and yet last winter they were only using 43 of them. The output of gas was about 41 million cubic feet a year. The total amount of capital that should have been expended ought to be £25,000, and not £37,000; so there was here an expenditure of £12,000 to £13,000 for dead-capital. There had been considerable difficulty about the breaking up of the roads. The Company had been continually doing this without giving notice to the Corporation.

Thursday, May 3.

On the resumption of the proceedings on the gas portion of the Bill to-day,

Mr. *George Brown*, a member of the Town Council, said he was strongly in favour of the acquisition of the Company's undertaking by the Corporation. In his view, it would ultimately be to the benefit of the public. There had been complaints about the breaking up of roads, and of the delay in the laying of mains. He considered the works of the Company were excessive in both size and character, and there were complaints of "want of up-to-dateness."

Mr. *Haddock*, the Town Clerk, said during negotiations between the Corporation and the Company the price of £80,000 was mentioned. He said at the time that, in his opinion, it was an absurd price.

Mr. *Albert Walker*, a member of the Town Council, considered the Company's buildings were of an extravagant and expensive character. The late Manager, who had been with the Company for forty-five years, managed their affairs in a most high-handed manner.

Other local evidence having been given,

Mr. *J. E. Pickard*, the Borough Surveyor, said that he had taken 108 towns with an average population of 13,500 (about the same size as Pontefract), and the average number of consumers in those towns was 2269; whereas the number of consumers in Pontefract was only 676. Therefore the proportion was 70 per cent. less than in the average of the other towns he had selected.

Mr. *Gibson*, the Borough Accountant, said that on their rateable value the borough had at present borrowing powers for about £93,000 under the Public Health Act, and their outstanding loans were about £60,000; so that under that Act they had still a margin of about £33,000 in their favour.

Mr. *E. H. Stevenson* stated that he had inspected the works and found they were very largely in excess of the requirements of the locality. This meant that there was a certain amount of money which was really dead-capital—capital which had never been brought into beneficial operation. To this extent, there was a bar between the consumer and cheap gas.

Mr. WEDDERBURN: Ought it therefore to be the duty of every gas company, as trustees not only for the shareholders but for the consumers, from the first to see that whatever capital they expend is capital which is necessary to spend, and that it is of a remunerative character?

Witness: Yes, it ought to be so. Of course, under modern legislation, where the company and consumer are partners in the concern, I may say this is carried out very strictly indeed.

In the case of this Company, is the position this: That, having all along paid their maximum dividends, their interests, *qua* trustees for the shareholders, is over, and that they are now trustees and trustees only?—Well, the Company occupy rather a peculiar position among gas companies. They have not been to Parliament for 33 years—that is before the auction clauses came into general use. Therefore there has been a temptation to issue more capital than is necessary. At any rate, the Company have spent large sums of money on land which is utterly useless to them; on buildings which are also utterly useless to them; and upon other things.

Does that mean that there has been an expenditure of capital to a large extent, and all to the detriment of the consumer?—Yes; and we find this common to all maximum-price companies. Whether they are under the auction clauses or whether they are not, they spend more capital than the standard-price companies do. That is common to them. Throughout the whole of England, the maximum-price companies have spent something like £150 per million feet of gas sold more than the standard-price companies. With regard to Yorkshire, all the maximum-price companies have spent about £200 per million feet of gas sold more than the standard-price companies.

Witness went on to say that this was a very stationary Company, and that during the last three years there had been practically no progress whatever. The low percentage of houses taking gas was a singular thing for Yorkshire towns; for in most Yorkshire towns 75 per cent. to 80 per cent. took gas. He then went on to criticize the works. The Company had 79 retorts; and last winter 36 were not used. So that the number of retorts was largely in excess of the requirements. The condenser, the scrubber, and the gasholders were out of proportion to the quantity of business; and the offices and buildings were of an extravagant character, not only in their size but in their elegance. He contended that the Company had misused their powers, had called up capital unnecessarily, that they had not considered the consumers, and, with regard to the price, that the only hope in the future for the consumer to have lower prices was for the Corporation to get the undertaking. Then, after a time, when some of the borrowed money had been repaid, would come a reduction. It would be better than that the Company should go on and always have this burden round their necks. He was absolutely convinced that there would be no rate-in-aid.

Evidence having been called for the Company, the Committee adjourned.

Friday, May 4.

On the resumption of the hearing to-day,

Mr. *Thomas Wordsworth*, a Director of the Gas Company, and Mr. *Taylor*, the Chairman of the Company, gave evidence to the effect that they did not wish to sell the undertaking to the Corporation.

Mr. *Ernest William Drew*, of Messrs. Wood, Drew, and Co., examined by Mr. FORBES LANKESTER, said they had had the accounts of the Company in their hands ever since it was made a statutory concern. He did not consider that there had been any over keenness in issuing the capital, as had been suggested, in order to provide a profit of 7 per cent. among the shareholders. If the Company had desired to pay a larger amount of profits by way of dividends, they could have called up the share capital much earlier than they did.

Mr. FORBES LANKESTER: Having had the accounts through your hands from the beginning, what do you say from that point of view as to the character of the Company?

Witness: I have every reason to believe, from what we have seen of the Company, that it has been carried on in a business-like way, and with a certain amount of economy as regards the management.

Mr. WEDDERBURN: You, of course, would have to audit the accounts on behalf of the shareholders; and when you speak of the conduct of the Company, you naturally look at it from the point of view of those on behalf of whom you were acting?

Witness: Certainly.

Witness further said he had never been asked by the Directors directly to give them his advice on a question of policy. As regarded the amount which had been expended from time to time out of revenue, he did not think it would be of any consequence at all.

Mr. *Laurence Whittaker* said he had been Manager of the works since February, 1905. The Company owned land which brought them practically up to the Lancashire and Yorkshire Railway Company's line; and he considered this an advantageous position for the works.

Mr. FORBES LANKESTER: You have various works there. Are they all in good condition?

Witness: Taking the works on the whole, they are in good condition.

It is alleged that they are too large—that there are too many retorts, for instance?—I cannot agree to that. There are plenty, and to spare, of retorts; but I consider that a good failing. In case of very foggy weather, they are certainly of very great use.

A MEMBER OF THE COMMITTEE: What was the largest number of retorts you ever had in use at one time?

Witness: 43 out of 79.

In further examination, witness said that one of the main features of Pontefract was that the houses were greatly of the small cottage property type—property which would be more naturally supplied by the slot meter than by any other means. This was being introduced throughout the town as far as they could do so. When he went to Pontefract, there were about 114 slot-meters; now there were about 450. It was in this direction, and in the use of stoves for cooking, that the Company hoped to improve their business. He would not be able to do any better for the Corporation than he could for the Company.

Cross-examined by Mr. WEDDERBURN, witness said he thought in a few years they might possibly be able to double the consumption. Asked why the Corporation should not be able to increase the popularity of gas as well as the Company, he replied that it was all a question of price. It depended on whether the Corporation could supply the gas at the same figure as the Company. He would not describe the retorts as up-to-date in their character. It was true that the number of retorts in use depended to a great extent upon how they were managed. One manager might be able to do with 43 what a less competent man could only accomplish with 63. In the matter of laying mains and services, the Directors had always been willing to meet the consumers in a reasonable way. Witness also had put himself out of the way to meet the customers.

The CHAIRMAN: With regard to the slot meters, they are expensive, are they not?

Witness: They are more expensive than the others.

The CHAIRMAN: Do you know how the Directors intend to meet the expenditure of capital on them? Have you been told you must limit your expenditure in any way? You have no idea how that is to be met?

Witness: That question has to be thoroughly gone into.

Mr. *Corbet Woodall*, in answer to Mr. FORBES LANKESTER, said that in all his experience he did not know of any case in which Parliament had sanctioned the compulsory purchase of a gas company by a corporation where the company were not themselves in any way asking for new privileges or fresh powers from Parliament. On the lines of this case, there was no precedent. With regard to the complaints that had been made as to the character of the works, witness said he could not recollect a more frivolous set of objections than those which had been raised. It was quite true that the plant of the Company was somewhat in excess of present necessities. The increase of consumption had been interrupted, for reasons already explained. If it had gone on without these interruptions, the margin of works would have been smaller than it was. The main allegation against the Company was the large amount of gasholder room. The Company some three years ago built a new holder. They would have been silly if they had erected a smaller one than they did. It was to provide for ten or twelve years to come. With regard to the retorts, they had done their work very well indeed.

In answer to Mr. WEDDERBURN, witness said that where a gas company were not coming before Parliament, and where the sole Bill before Parliament was a Bill by a corporation to buy up a gas company against their will, there was no precedent for it, and there ought never to be one. Of course, where a company had failed in the performance of its duty, there was no reason why a transference should not take place at any time. Here, the whole of the profits earned would go to the shareholders in the Company. The Corporation, however, would have to wait for increased business for their profit. It was extremely probable that for a time they would have to draw upon the rates in aid of their gas supply. If the public interest was really in the direction of transfer, then Parliament would decide to transfer gas undertakings to municipalities. He denied altogether that the public interest did demand it in this case, or generally; and he considered it undesirable that gas undertakings should be put outside the opportunities of investment for private capital and the exercise of private enterprise, unless there was a strong reason. People did not care to be disturbed in an investment that they had been used to for a good many years, and which they knew about. There were 1200 houses supplied with gas, and he thought they could get 600 or 700 more. In three years hence, he had no doubt whatever that the increase of the Company's business would be considerable. They would have overcome little matters of retorts and so forth.

In answer to the CHAIRMAN, witness said he did not regard the present results as at all discreditable to the Company, considering the size of the works. The price of gas was as low as the companies round about. The capital invested was just about the average of the gas companies in Yorkshire.

Mr. *Henry Tobey*, of Malton, also gave expert evidence.

Mr. FORBES LANKESTER, in addressing the Committee on behalf of the Gas Company, said that, to justify a purchase clause, misconduct must be proved. What misjudgment there had been in this case could not be regulated by purchase. He asked the Committee as a matter of common sense to say at the most that what had been done by the Company did not amount to misconduct in any sense. They were prepared, owing to the size of their plant, to meet a much larger demand than would have been possible had they kept their plant down. The Company objected to compulsory purchase; the shareholders would not listen to such a suggestion. They did not want to sell, or to be forced to sell; nor did they want to go to the expense of arbitration. Nothing had been done which laid the Company open to any suspicion. The powers were given to the Company in 1873; and they contended they had done nothing to forfeit their right to them.

Mr. WEDDERBURN, in replying, said the Company could not be in a better position than they were now. There was nothing more to be done for the shareholders. They were paying their maximum dividends. Why not settle it now? Everything which was to be done was for the consumers' interest. Why should they not choose trustees who would be responsible for keeping up the business? He would like to say that, having from the first paid their maximum dividends, they must find that their security would be regarded as a high one. There were no back-dividends. Since 1873 they had always paid their maximum dividends. The amount of money which had to be expended to bring the works up to date might to some extent reduce their security. Further, the security in the future might be lessened by the electric light. He submitted that the Corporation were coming to purchase at an opportune time.

The Committee having deliberated,

The CHAIRMAN said the Committee considered there was not a clear line in this case. The decision of the Committee was in favour of the clause. They felt there had been some want of enterprise on the part of the Company which, in the minds of the Committee, probably resulted in the public suffering not only in the price of gas, but possibly also in inconvenience of supply. The Committee were also quite impressed with the fact that there had been some readiness shown to negotiate. Therefore their decision was in favour of giving the Corporation the power of compulsory purchase.

Lincoln Gas Supply.—The statement of Mr. J. Carter, the Manager of the Lincoln Gas-Works, with reference to the operations of the twelve months to March 31, shows that 312,503,000 cubic feet of coal gas were made, against 293,991,000 cubic feet the preceding year; while 42,348,000 cubic feet of carburetted water gas were manufactured, as compared with 41,089,000 feet. The total make was thus 354,851,000 feet in the past year, and 335,000,000 feet in the preceding twelve months. Of new consumers, 470 were added; the number now being 10,314.

UNOPPOSED BILLS.

Last Thursday, the Unopposed Bills Committee of the House of Commons met, under the presidency of Mr. ALFRED EMMOTT, the Chairman of Ways and Means, and dealt with several Gas Bills.

Southampton Gas Bill.

This Bill is to authorize the Southampton Gas Company to raise additional capital.

Mr. BONNOR-MAURICE (Messrs. Bircham and Co.) said the promoters sought to raise £350,000 of capital, with borrowing powers to a proportionate amount, for the purposes of meeting the ordinary requirements of the district supplied.

The CHAIRMAN remarked that the amount was very large, and said the Committee had better hear why so much was wanted.

Mr. *E. W. H. Eady*, the Secretary of the Company, said the existing capital was £544,000, with £123,000 by borrowing. They had expended this sum with the exception of about £7000; and now they were proposing to raise £350,000 of ordinary stock. The Company's district was a very large one; and they contemplated carrying out additional works. They had a large working-class district; and he anticipated that they would have another 5000 to 7000 slot meters.

Sir CHANDOS LEIGH (the Speaker's Counsel): How many have you, and in what population?

Witness said that they now had 12,000 in a population of 150,000. He also said that the Company's statutory illuminating power was 14 candles, and their selling price 2s. 10d. per 1000 cubic feet.

It was decided to amend the Bill so as to bring it into accord with the decision of the Committee who had had under consideration the Gas Companies (Removal of Sulphur Restrictions) Bill; and when amended it was ordered to be reported for third reading.

Peterborough Gas Bill.

This Bill is promoted by the Peterborough Gas Company to enable them to consolidate and convert their capital, acquire additional lands, and raise more money.

Mr. Corbet Woodall, in giving evidence for the promoters, said the present capital of the Company was £100,000; and they were now asking for authority to issue £80,000 of stock, including premiums——

The CHAIRMAN: You are going to double your capital?

Witness: Rather more, Sir.

Tell us why you think this is a reasonable request?—It is usual to ask and grant powers for about fourteen or fifteen years to come. The amount of capital expended by the Company in proportion to the business has been £750 per million cubic feet in the past. We have taken the same rate for the future; and if we double the consumption within fourteen years, we shall necessarily double the expenditure. The business would require works, meters, and so forth, in proportion to the increase of business; and we have provided on the basis of £750 for each additional million cubic feet of gas we have to supply. Our production is 144 millions.

Sir CHANDOS LEIGH: What do you actually supply gas at?

Witness: For ordinary lighting at 2s. 10d. per 1000 cubic feet, and at 2s. 6d. for heating, cooking, and similar purposes.

What illuminating power do you give?—It is 14 candles.

In answer to a question by a member of the Committee, witness said, with regard to increasing the dividend, that there had been some advantage given to the consumer. If they took the price of 3s. and left it there, the Company could at once increase their dividend without giving any advantage to the consumer. Arrangements had therefore been made that there should be no addition to the dividend until the price of gas was less than at the present time.

The CHAIRMAN: To increase the dividend, you must come below 2s. 10d.?

Witness: That is so. Until there is a reduction in the price of gas, it is against the Company. If coal is dear, we shall benefit; but if it is cheap, we shall both benefit.

The Committee ordered the Bill to be reported, with amendments.

Rochester, Chatham, and Strood Gas Bill.

This Bill, promoted by the Rochester, Chatham, and Strood Gas Company, provides for the consolidation and conversion of the capital, and asks for authority to raise more money.

Mr. CRIPPS, who represented the promoters, pointed out that they had had no Act since 1867, and that they wanted an increase of capital. The amount they were asking looked rather large; but the Company had been spending considerable sums of money out of revenue, with the result that the works as they stood were worth a great deal more than the amount of the capital account.

The CHAIRMAN: You are asking altogether for powers for £220,000, whereas your present nominal capital is only £64,676.

Mr. CRIPPS explained that the undertaking had been carried on out of revenue for a long time, and they had overspent their capital. The quantity of gas sold by the Company last year was 471 million cubic feet, which worked out at less than £200 per million, against an average of £750 in the case of other gas companies. It was not legal to apply profits for capital purposes; but it was very much to the advantage of consumers of gas. He was not making a charge against the Company, but really they ought to have come to Parliament some years ago to put themselves into possession of funds. There was no possible object in keeping down the capital so low as they had done, and refraining from increasing their business. Such a course was open to criticism. They had two manufacturing stations; but they would require a new retort-house, and they were almost absolutely without modern plant. Their standard price was 2s. 11d. per 1000 cubic feet; but they were at present charging 2s. 9d., and they had paid the full dividend.

The Bill was ordered to be reported for third reading.

MID-OXFORDSHIRE GAS BILL.

Unopposed Bills Committee—House of Commons—Friday, May 4.

(*Mr.* ALFRED EMMOTT, *Chairman of Ways and Means, Presiding.*)

The hearing of this Bill, the opening proceedings in which were given in the "JOURNAL" for April 10 (p. 121), was resumed to-day, when

Mr. BAKER, who represented the promoters, stated that since the last hearing they had acquired £6500 share capital and £19,550 debenture stock; the total amount being £42,215. So that the Company had a good deal more money than sufficient to complete their three remaining purchases.

The CHAIRMAN: What is this agreement with some financial company?

Mr. BAKER: It includes the promotion of the Company, and also various conditions which are included in the agreement.

The CHAIRMAN: You say that the consideration money payable under this agreement to the Finance and Construction Company, Limited, is £17,500. How is this going to be paid?

Mr. BAKER: An arrangement has been made whereby the Company will accept a sum of £6500 in shares of the Company, and £6500 has been subscribed in addition.

The CHAIRMAN: How will the balance be paid?

Mr. BAKER: In cash. The amount subscribed is £26,050, and the sum required £13,700; leaving a balance of £12,296. The Finance and Construction Company are paid every item of expense.

Mr. *Barnes*, a solicitor, was called as a witness, and said that he had carried through all the purchases; and arrangements had been made with regard to special debenture stock. Special debentures were issued to the vendors of an undertaking in payment of the purchase money to the extent of two-thirds in all cases. It was less than two-thirds in some cases; but that was the maximum.

The CHAIRMAN: You will have to give us the exact particulars. I cannot make anything out of the prospectus. We must get this accurately. Are these special debentures outside the £13,000?

Witness: Yes.

The CHAIRMAN: It is a peculiar kind of finance, is it not? You have a special debenture, and a general debenture after, and all the rest of the money goes to the Finance Company.

Mr. BAKER: It has been done in other cases.

The CHAIRMAN: What is the amount of special debentures you have issued then?

Mr. BAKER: £12,165.

Sir CHANDOS LEIGH: There was a petition by the Urban District Council against your Bill; and this petition was withdrawn on the the understanding that you cut Witney out. Now Witney appears in the prospectus. How do you explain that?

Mr. BAKER: We cannot get Witney out altogether, because we had agreed then to purchase the Company. As regards Parliament and the Bill, and the area of several other Gas Companies, Witney is not in the Bill. Therefore we are in the same position as the Witney Gas Company at the present day.

Sir CHANDOS LEIGH: Do you expect to get 100 consumers out of Shipton?

Witness: I think so.

Sir CHANDOS LEIGH then pointed out that the population of the place was 702.

Mr. BRYNMOR JONES: On Oct. 27 last, an agreement was made with some solicitors.

Witness: Yes. That was with regard to remuneration.

And on Nov. 13 there is an agreement with a coal merchant, that he is to have the exclusive right of supplying coal for the purposes of the Mid-Oxfordshire Gas and Coke Company's undertaking?—Yes.

In reply to a further question, witness stated that a series of special debentures was charged upon particular property.

Mr. BRYNMOR JONES: Are all these special debentures charged upon all property?

Witness: Each undertaking that is purchased has special debentures issued to it in respect of part of the purchase money.

So that a special debenture is charged upon two-thirds of the actual property?—Yes.

Sir CHANDOS LEIGH: Have you, in addition to this coal contract, formulated any other contracts?

Witness: None.

Mr. BRYNMOR JONES: After the Bill came before the Committee, you made a new agreement with the Finance Company?

Witness: Yes.

Before the Bill came before us, there was no agreement?—The first agreement was on March 21.

Then the promoters were acting as agents for the Finance Company before this agreement was made?—That was the effect of it.

In reply to a further question by Mr. BRYNMOR JONES, with reference to allegations made by the Witney Council in a petition by them against the Bill, witness stated that he did not know upon what terms it was agreed that the petition was withdrawn.

The CHAIRMAN: What security has Mr. Moore?

Witness: He has only paid £1000.

Do you say he is not a shareholder?—I do not think he is. Mr. Moore gets no advantage with regard to the price of coal. The only advantage he gets is as a customer.

Sir CHANDOS LEIGH: But you must have stock?

Witness: Yes; but we buy only what we think necessary.

The CHAIRMAN: From all other gas companies we have had particulars of the cost and consumption of gas and so on, and of the profits which are made. What I want to get at is the profits, and what capital those profits are calculated upon. I want to know on what capital 7½ per cent. was paid last year.

Witness: I cannot say what the 7½ per cent. was based upon.

Sir Chandos Leigh asked witness a question to which he did not give a satisfactory answer, whereupon

Sir CHANDOS LEIGH remarked: After I asked the witness a question, I look at the report and find the answer to it.

Mr. BAKER said that in some cases the rates had been reduced.

Sir CHANDOS LEIGH: The question is: What are these different companies selling gas at now?

The CHAIRMAN: You would have no money for all these great improvements you are going to make.

Witness: They are provided for.

The CHAIRMAN: What are the actual parliamentary powers you are wanting to get from us which you could not get by buying these Companies outside Parliament?

Mr. BAKER: Hardly anything. I am giving you more than I am asking for.

The CHAIRMAN: What is it you are actually asking for?

Mr. BAKER: Simply a statutory power to break up the roads of these various districts.

The CHAIRMAN: Where are you asking for powers to break up roads?

Mr. BAKER: In the area of supply defined by the Bill. The only other power we ask for is that we shall not be subject to a nuisance clause with regard to the gas-works, inasmuch as some of the works have been up for a long period, and no objection has been taken.

After a short adjournment, the Committee found that the finance of the Company was so unsatisfactory that, on grounds of public policy, they declared the preamble of the Bill not proved.

LONDON COUNTY COUNCIL (ELECTRIC SUPPLY) BILL.

The Select Committee of the House of Commons, of which Mr. LUKE WHITE is Chairman, from Tuesday to Thursday of last week were engaged in the consideration of this Bill, which proposes to confer powers on the London County Council with respect to the supply of electrical energy in the Administrative County of London and neighbouring places.

There are a large number of petitioners against the Bill, including the Brentford Gas Company, the Grays Gas Company, the Gaslight and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company (the last three Companies being represented by Mr. C. A. Cripps, K.C., and Mr. Neville), the Mitcham and Wimbledon Gas Company, the South Suburban Gas Company, the Wandsworth and Putney Gas Company, and the West Kent Gas Company. In the course of the proceedings, the position of the Gas Companies was several times touched upon.

Mr. *T. M'Kinnon Wood*, M.P., the Chairman of the Parliamentary Committee of the London County Council, cross-examined by Mr. CRIPPS, said the scheme, as regarded the supply of electricity, would be competitive in a certain sense with the business of the Gas Companies—for power particularly.

Mr. CRIPPS: Both as regards power and light, to an extent. Particularly of recent years, there has not been a certain division, in this sense—that the Gas Companies have supplied the poorer parts of the community in London, and the Electric Lighting Companies the richer parts?

Witness: There has been a great deal of public lighting in the richer parts by gas. I am not prepared to say that you could draw that very broad distinction; but, of course, it is quite true that by slot meters the poor consume a great deal of gas.

I see that at the present time the income of the Gas Companies from slot meters, which are supplied in the poorer districts, has come to over a million pounds a year. It has increased very much, has it not, in recent years?—Very much.

I want to put this consideration to you. First of all, as you say, there would be some competition with the Gas Companies who supply, among others, the poorer districts; and, secondly, there would be risk, would there not, if your scheme was not a success, of additional charges in the nature of rates being put upon the Gas Companies?—Yes; I suppose they would have to pay their share, if there were a loss.

From the gas consumers' point of view, it is rather hard, is it not, that he should have to pay in the form of rates for a competitor who may put up the charges against him?—From the gas consumers' point of view it seems to me that if you reduce the price of a competitive source of light, you would probably reduce the price of gas, because the Gas Companies are making very reasonable profit.

At the present time the Gaslight and Coke Company charge 2s. 11d. per 1000 cubic feet?—Yes.

Do you know what proportion of that charge to the consumer is due to the rates they pay?—No.

Do you know that it is as nearly as possible 1-10th, or that 3d. out of 2s. 11d. is a charge put on the consumer owing to the heavy rates? Are you aware that the Gas Companies whom I represent here are now paying £400,000 a year in rates in London?—I will take the figure from you

Surely, as a matter of principle, it is a serious thing, is it not, for you to compete with the Gas Companies, and at the same time to have a power of charging them to provide money for a scheme which is in competition with themselves. That is rather a harsh measure, is it not?—I do not know that it will make very much difference to the Gas Companies whether they are competed with by a great private company or by the County Council. It seems to me that the effect to them will be very much the same.

Do you not think it makes a difference if you are charged under the form of rates to compete with yourself? I should have thought that it made all the difference?—If our anticipations are realized, and we make a profit, they will not have to pay so much rates.

But looking at this as what has been called a speculative undertaking, which eventuates in not making a profit, what would you say?—We are not going into it with that idea or expectation.

But I am assuming your expectations are not realized?—Then, of course, it will be unfortunate for all ratepayers.

If it was a competing company, I agree no one could complain; but supposing that it is a competing scheme, and we have to pay rates to

support a scheme to compete with ourselves, that introduces a special element, does it not?—It is not an element that is special to Gas Companies; it is one which is common to all ratepayers.

I do not think so. You are competitors with the Gas Gompanies, but not with the ordinary ratepayer?—No; but the loss would fall equally on all.

That is not my question. You come here saying, at any rate, that as to the ordinary ratepayer you are going to give him an advantage, because he will get his light or power on better terms—that is your case?—Yes; I think I see your point.

Let us differentiate the position of a Gas Company. The Gas Companies will not be advantaged in proportion as you succeed in your scheme, but they will be disadvantaged. Therefore they stand in a different position?—Yes.

Is not that rather a harsh measure on the Gas Companies?—I think it is a general argument against any kind of municipal enterprise. I do not think it is any more.

Is it not rather more than that?—It applies in this case, as you say.

No doubt partially it is an argument against the whole principle; but it is a very special argument, is it not, when a person sought to be charged is in the position of a competitor, who at the same time may be injured by the introduction of such a scheme as you propose?—They naturally grumble; they naturally object.

When you talk about naturally grumbling, grumbling is natural when you are unfairly treated?—I do not admit that it is unfair. Of course, if we make a loss, I admit that it will be very unfortunate for the Gas Companies.

And still more unfortunate if that loss is laid upon them by a rate to which they are not subject now?—Yes, of course.

Mr. Lewis Coward, in the course of re-examination, asked: Mr. Cripps suggested on behalf of the Gas Companies that the poorer parts of London were not interested in electric supply. What do you say to that?—I represent a portion of London which is one of the poorer parts (Hackney); and they have a very successful electric supply. The same is true of another very poor part of London—Poplar. Stepney also uses a good deal of electricity; and some of these poorer parts are industrial districts in which a considerable development of electric supply may be expected.

As to whether the scheme would be a paying concern, witness said this would be for experts to justify; but his opinion was expressed by his backing the Bill.

Mr. Freeman's speech, the evidence of Mr. M'Kinnon Wood, and the evidence-in-chief of Mr. J. H. Rider, Electrical Engineer, occupied the three days; and the Committee adjourned till to-day (Tuesday).

LEGAL INTELLIGENCE.

A HURRIED TEST OF GAS AT GUILDFORD.

For the first time in their history, the Guildford Gas Company recently had to appear in Court on a summons for supplying gas below the standard of 15-candle power required by their Act—the figure given in the summons being 14·01 candles. The Town Clerk (Mr. F. S. Miller), who conducted the prosecution, said that the Gas Examiner (Dr. S. Rideal) attended at the gas-works and made a test on the 23rd of March, with the result that the gas was found to be of the illuminating power stated. A letter had been received from the Secretary of the Company (Mr. W. Titley) in which exception was taken to the way the test had been made; it being asserted that the candles used did not burn the specified time. A test made by the Manager (Mr. G. R. Love) immediately after Dr. Rideal's, showed the gas to be of 15·25-candle power.

Dr. Rideal was called, and stated that he arrived at Guildford at 6.46 on the day named, and reached the testing-station about 6.50. Having satisfied himself that the candles were burning normally, he proceeded to take ten readings at intervals of one minute. He made a correction for the rate at which the candles were burning, as well as for temperature and pressure. When he had completed the test, the Company's Manager said the candles were not burning the full time, and asked him to make another test. This he declined to do. In cross-examination, he said that if there had been anything radically wrong with the test, he would have discarded it. In answer to the Chairman of the Bench, witness said he agreed with the Manager that the explanation of the low result of the test was that the gas was stale. The pipe from the main to the burner in the testing-room was of a good length; and before the whole of the gas in it could get out, nearly an hour would elapse. He reached the testing-room a little before seven o'clock. He did not time himself by his watch, but by the train. He did not time the lighting of the gas-burner for the absolute 15 minutes by his watch. He went straight to the testing-station, lit the gas, and finished the test at 7.20. The candles burnt for 9·1 minutes. He timed the burner by common-sense and arithmetic, as well as by his watch and a timepiece.

Mr. Williams, who appeared for the Company, submitted that Dr. Rideal had not made a proper test of the gas. He arrived in Guildford practically at ten minutes to seven; and he had to go to the testing-room, which took time. A new chimney was put on by the foreman. He had to allow at least 15 minutes for the gas burning, and he was bound to expend ten minutes for his ten observations. In the meantime, a discussion arose between him and the Manager. He (Mr. Williams) contended that all this could not be done in the time he did it, allowing for the legal periods prescribed by the Gas-Works Clauses Act, 1871. Therefore, if the Bench had any doubt on the matter, they were bound to dismiss the summons on its merits, and he asked them very seriously to do so.

The Chairman said the Bench felt that they could not convict in the case, considering that the time had been unsatisfactorily explained. It was perfectly clear that it was the duty of the person making the examination to wait for 15 minutes after lighting the gas before the testing began; and also that ten observations must be made, and that they should occupy one minute each. Therefore, without calculating anything between the observations, this made 25 minutes. It was not by any means satisfactorily proved that the time Dr. Rideal was at the testing-place enabled him to devote the whole of it to the testing. They felt that the test was made in too much of a hurry, and therefore they did not feel inclined to convict, but dismissed the summons.

New Export Incandescent Lighting Company in Liquidation.

Under a compulsory winding-up order, made against the New Export Incandescent Lighting Company, Limited, accounts have been lodged, showing debts amounting to £3179, and assets to £228. Mr. H. E. Burgess (the Official Receiver) reports that the Company was formed in July, 1901, with a nominal capital of £500, to carry on the business of merchants, makers, or fitters of incandescent and other lighting fittings. The promoter was Mr. L. S. Liebermann, of 34 and 36, Maxwell Street, E., who states that he converted his business into a limited company with the view of raising more capital with which to finance the concern. Debentures for £700, covering the whole of the assets and undertaking of the Company, were issued in November, 1905, and in January last Mr. Oscar Berry, as Receiver for the debenture holders, took possession of the assets and closed the business. The failure and insolvency of the Company were attributed by Mr. Liebermann to the fact that no compensation was paid to him for damage sustained through a fire which occurred in May last; also to loss on the trading, by reason of severe competition. The liquidation remains in the hands of the Official Receiver.

Consumers and Gas Profits at Carnarvon.

Mr. Holden, the Borough Accountant, reported to the Carnarvon Town Council last Tuesday that there was a net profit of £622 on the past year's working of the Gas Department, which was the highest ever achieved with the exception of 1901. He anticipated that in future there would be a saving of about £150 per annum in the item for meters. The most serious effects of the introduction of electricity had already been experienced—the continual increase in the sale of gas for cooking purposes about balancing the loss of consumers now adopting electricity. The Gas Committee recommended that a reduction of 3d. per 1000 cubic feet be made in the price of gas for both lighting and cooking purposes. Mr. Thomas congratulated the Gas Committee upon the satisfactory character of the report, and proposed, as an amendment, that the profit be applied to the reduction of the rates. Dr. Parry (Chairman of the Gas Committee) opposed this, as a proposal which would operate unfairly against the gas consumers, through whose assistance the works would become the property of the Corporation in about twenty years' time. The Committee's report was thereupon adopted.

Public Lighting in Bermondsey.

At the Meeting of the Bermondsey Borough Council last Tuesday, the Street Lighting Committee reported having had under consideration a communication from the Borough Surveyor on the subject of the public lighting. Among other things, the Committee found that the lighting and maintenance of the gas-lamps in the parish of Bermondsey are under the control of the Council, and that the gas is supplied by meter. In the district of St. Olave, gas is charged for at a certain rate per lamp, which varies in accordance with the description of burner and the current price of gas; the lamps being lighted and maintained generally by the Council. In the parish of Rotherhithe, the lamps are charged on a rate which varies in accordance with the burner used and the current price of gas; but this includes gas and maintenance by the South Metropolitan Gas Company. The rates for Rotherhithe and the district of St. Olave, including gas and maintenance, are generally higher than those in Bermondsey. The Committee gave details of the charges, and expressed the opinion that the whole borough should be put upon a uniform basis, thereby effecting a considerable saving. In order that this may be done, it will be necessary to fix new meters in the district of St. Olave and Rotherhithe in the proportion of 1 meter to 20 lamps, the cost of which must be borne by the Council. This will amount to £157 5s. But the Committee said the outlay would be more than recouped owing to the decreased expenditure for gas and maintenance. The present cost of the lamps under the Gas Company's maintenance is £2292 3s. 6d.; the cost if entirely taken over by the Council as with Bermondsey would be £1992 0s. 7d., or a saving of £300 2s. 11d. The outlay in providing the meters, brick pits, and reinstatement would be £157 5s. The net saving on the first year would be £142 17s. 11d., and the annual saving after the first year £300 2s. 11d., less depreciation on meters £17 9s. 5d. per annum; showing a net annual saving of £282 13s. 6d. In conclusion, the Committee recommended: (1) That the whole of the lighting should be taken over from the Gas Company in St. Olave's and Rotherhithe from the 24th of June next; (2) that the lamps should be put on meters, which should be supplied by the Borough Council; and (3) that in future the whole of the borough should be placed upon the same basis as the Bermondsey district. The consideration of the report stands adjourned to the next meeting of the Council.

Toulon in Darkness.—The waiters in Toulon recently decided to come out on strike; and the employees at the gas-works made common cause with them. Not content with leaving their employment—thereby throwing the town into darkness except those parts which are lighted by electricity—they damaged the gas-jets and broke the glass of the public lamps. The Prefect endeavoured to effect a settlement of the dispute.

MISCELLANEOUS NEWS.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Meeting of the Proprieters of the Association was held last Tuesday, at the Cannon Street Hotel, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. R. W. Wilson) read the notice calling the meeting; and subsequently the following report of the Directors:—

The Directors have much pleasure in reporting that the operations of the Association during the six months ended Dec. 31 last were satisfactory.

The quantity of coal carbonized during the half year was 466,512 metric tons, which cost, on the average, 17s. 4¼d. per ton delivered into the retort-house. This price is within the one-hundredth of a penny, the same as that paid in the corresponding half of 1904. The yield of gas per 1000 kilos. was 10,701 cubic feet, and the quantity sold was 9959 cubic feet.

The prices obtained for coke were satisfactory, and ammoniacal liquor and its products realized better prices than in the corresponding half year. Tar, however, owing to the decreased value of pitch, yielded a somewhat less satisfactory return. Taking the products of distillation together, the results obtained were better than those of the corresponding half year, as indicated by the net cost of the coal. This, for the period under review, was only 6s. 8¾d. per ton, or 7¼d. per ton less than in the second half year of 1904.

The quantity of gas sold during the half year under review exhibited an increase of 6·84 per cent. on that of the corresponding six months of 1904. The receipt per 100 cubic metres of gas sold exhibited a small decrease.

The number of meters employed amounted to 407,034, which included 82,658 prepayment meters, or over 20 per cent. of the total. The increase in the number of meters placed was 38,008, or 10·29 per cent., and in prepayment meters separately 12,886 or 18½ per cent. On Dec. 31 last the total number of consumers on the books of the Association was 334,943, as compared with 301,361 on Dec. 31, 1904—an increase of 33,582, or over 11 per cent. About 80¼ miles of new mains were laid during the six months, bringing up the total length to 2195 miles.

The net profit of the half year amounted to £228,695, as compared with £219,235 for the corresponding period of 1904—an increase of £9460 or 4·3 per cent.

At Antwerp, the Directors have decided upon a scheme for the utilization of the land recently bought at Hoboken; and the erection of a new gas-works will soon be commenced there. Contracts for the supply of gas until 1935 have been concluded with the communes of Mortsel and Wyneghem at this station.

At Berlin, the continuous increase of the business necessitated considerable additions to the plant and mains. On the Gitschinerstrasse works, a complete plant for dealing with the coke was installed; and a third hydraulic crane was erected upon the wharf to facilitate the unloading of coal from barges. At the Schoeneberg works, two additional sets of hydraulic machinery were added; and coal-stacking plant, formerly in use temporarily at Mariendorf, was erected. At Mariendorf, progress was made with the coal discharging and distributing plant; and the dock upon the Teltow Canal was brought near completion. The high-pressure system, referred to in a previous report, for the conveyance of gas from Mariendorf to different points in the areas of greatest demand, was put in action, and fully answered all expectations. The large new gasholder of 5,300,000 cubic feet capacity was completed, and put into action.

At Frankfort, the new gasholder tank upon the Bockenheim works was completed; and considerable progress was made with the new gasholder.

At Hanover, an extensive system of coal and coke handling plant was commenced, and plant for the same purpose at Lille was completed.

In conclusion, the Directors desire to draw the attention of the proprietors to the accounts for the half year ended the 31st of December last. These have been duly audited, and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme showing the profit of the Association for the half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 5 per cent. for the half year ended Dec. 31 last, payable, free of income-tax, on and after Tuesday, the 8th inst.

The Directors who go out of office by rotation are John Horsley Palmer, Esq., Robert Tindall, Esq., and Sir Charles James Jessel, Bart. These gentlemen are eligible for re-election, and offer themselves accordingly.

The Auditor who goes out of office is Montagu Somez Pilcher, Esq., who is eligible for re-election, and offers himself accordingly.

UNREST IN THE LABOUR MARKET A BLACK CLOUD.

The CHAIRMAN said it was with much pleasure that he rose to propose the adoption of the report. He said "with much pleasure," because the Directors had brought before the proprietors a report which he thought everybody would consider eminently satisfactory. It showed that their working had been good in almost every department; and the only thing which hung like a big black cloud over the business of the Association was the unfortunate unrest in the labour markets of Europe to which he should refer later on.

WORKING OF THE HALF YEAR—MARKET FOR RESIDUALS.

To turn to the workings of the concern, the Secretary had informed them that there had been an increase of nearly 7 per cent. in the consumption of gas. This was satisfactory; and if it had not been that they encountered a very mild and open December, he should have been able to add "very" to the word satisfactory, because, in analyzing the amount of gas sent out, he found that, over the first five months of the half year, the increase was rather above 8 per cent., but in December it dropped to nearly 4 per cent. As the December output of gas represented a quarter of the whole of the half-year's make, the proprietors would naturally see that, when they had a mild December, the average was brought down. The mild weather naturally influenced the sale of coke, and when, of course, the output of that product was at the highest. But he was glad to say, though they had considerable stocks at the end of the year, they were 10,000 tons less than at the corresponding period of 1904. The average price obtained for coke was exceedingly satisfactory. They had again had good prices on the Continent—far higher prices than those obtaining in England. The average worked out at 16s. 11d., against 16s. 6¾d. in the corresponding half of the preceding year. Then, again, they had benefited by the good prices obtained for sulphate of ammonia on the Continent. He believed he had explained to the proprietors on previous occasions that they were in the habit of working up their ammoniacal liquor into various products, so as to meet the best market that ruled on the Continent. Sometimes they made muriate of ammonia, and sometimes sulphate of ammonia; and at Berlin, they also made caustic ammonia. But in the past half year their principal make was sulphate, because they were able to obtain an average price all through the half year of £12 3s. 4d., against £11 16s. 8d. in the corresponding half year. On the other hand, the price of tar rather diminished. As he dared say many of the proprietors knew, the price of tar was governed a great deal by the market price of pitch, which had fallen from the high figure that obtained about two years ago, and there had been a corresponding reduction in the price of tar; so that the average was 2s. lower than what it was a year ago.

LABOUR AND THE REDUCED MAKE OF GAS.

Then, again, they had a set-off against their good sales by the decrease in the average quantity of gas sold per 1000 kilos. of coal. For the half year, it had fallen rather below 10,000 cubic feet; the exact figure being 9950 cubic feet. Their Engineers (who were keenly alive to the necessity of keeping up a good sale of gas per ton of coal, and among whom a friendly rivalry existed in this respect) put it down to two reasons—one was the inferior quality of the coal that had been delivered by the German mines, and the second was the unwillingness of the men to work properly. This brought him to the question of that black cloud which, as he had already said, was hanging over the operations of the Association on the Continent. Everybody in the room, he was sure, had read in the daily Press reports from France, Germany, and all over Europe, regarding the great strikes. There was no doubt about it, there had been a great deal of unrest among labour on the Continent—not especially among their own men. But still there were strikes going on in the metal, sugar, and other trades; and this reacted on their men, with the result that they began to ask for this, and to threaten that. Now this was very disheartening to himself and to, he was certain, all his brother Directors, because they had done everything possible for their men in their works on the Continent.

WHAT HAS BEEN DONE FOR THE MEN—FUNDS AND WAGES.

He believed he was right in saying that the Association was among the very first of the great industrial undertakings on the Continent to establish a good and liberal system of pensions, sick pay allowances, and gratuities to widows and orphans, and also at their works they had brought into being very admirable arrangements for the personal comfort of the men—such as canteens, mess-rooms, washing-places, and everything that could possibly be desired. Therefore he said it was disheartening, after the Directors had done all this, to feel that the men were still always on the grumble. He did think that it was partly owing to the influence of the enormous protective duties upon the necessaries of life which had raised the price of meat, bread, and other things required by the workman, to such a pitch that the men were in the present state of unrest. Their Engineers told them the same. The result of this was that they had been obliged to raise the wages of the men considerably, following the example of other large employers, during the past half year. This additional expense meant more than £10,000 to the Association. It must be remembered that they employed a vast number of men. In the winter months they had 7400 in their employ; and the wages last year amounted to nearly £430,000. Then the question of labour brought him to another question, and that was the pensions and sick pay, and the allowances the Association made to the men. He thought it was this time last year that he explained to the proprietors very fully the system that was in vogue in the Association in this respect. But the system now involved them in such a sum that it would be absolutely necessary to put aside, from the profits, a pension reserve to meet the continually increasing growth of the amount. The sick pay and pensions to workmen amounted to more than £16,000, and the allowances and contributions to Government accident insurance, &c., to £11,500—making a charge for the year of nearly £28,000. And this was for the workmen only! There was also a large sum paid in pensions to the engineering and clerical staff. Necessarily, they had an enormous number of engineers and clerks in their employ. They numbered some 750; and they were most able and willing servants. Many of them had served the Association for a long period; and, of course, a great institution like this, which had been in existence for something like eighty years, must necessarily provide for those who worked for its welfare when the time arrived for them to retire. It had been the custom of the Directors to provide for these pensions out of the annual profits of the undertaking; but he did think, and his fellow-Directors agreed with him, that the time had arrived when they should set aside, from the profits, a certain sum for this purpose. The Secretary had read the scheme for the division of the profits. They were carrying forward a balance towards next half year, after paying the dividend, and setting aside a large sum for works' enlargement and repairing, of £21,014; and it was the Directors' intention, and he hoped that the proposal would meet the approval of the proprietors, to put £20,000 of this to a pension reserve, which would appear in the accounts of the next half year.

A CONSTRUCTIVE HALF YEAR—VERTICAL RETORTS.

He thought the half year they had under review might be called a constructive half year, because they had, at almost every station, been putting up various mechanical appliances to lessen labour—such as coal and coke handling plants and machinery for charging and discharging the retorts. They were obliged to put up these very expensive machines in consequence of their labour troubles. All these things made a large charge upon capital when they were first put up; but he believed there would be a very fair return on the outlay. Six months ago he spoke at great length on the subject of vertical retorts. He did not intend to do so on this occasion, because last half year two of the proprietors said to him on leaving the meeting that "it was perfect Greek to them;" and it would be "perfect Greek" to a good many more people there that day. But he might say that, while they were

going to erect inclined retorts in the first half of the second big retort-house at Mariendorf, as he explained six months ago, they intended to put up a set of vertical retorts at one of the subsidiary works in the neighbourhood of Berlin where additional producing power had become necessary. In due course, he hoped to give some results as to the working of the vertical retorts, because he knew that this subject was one of great interest to many gas engineers in this country.

FRIENDLY HELP.

That was all he had to tell the proprietors regarding the half-year's report and accounts. There were, however, one or two matters which had occurred since the close of the half year to which he wished to allude. First there was the terrible disaster which took place in the Courrières mine a short time ago. This mine was one from which the Association drew their supplies for various of their French works—especially Lille; and he hoped the proprietors would cordially agree with the action taken by the Board, who expressed not only their sympathy in a letter to the Managing-Director of the colliery, but sent a contribution of 5000 frs. to the widows and orphans fund. The Association were a little pressed for coal at Lille; but owing to the energy of their Secretary, and the kindly, neighbourly action of the European Gas Company, who handed over to the Association a cargo of coal destined for another port—(applause)—they were able to put a proper supply of coal into Lille, and so evaded difficulties which might otherwise have occurred.

NEW FACES ON THE BOARD.

The only other thing he had to mention was that, since the last meeting, it would have been observed there were two new faces on the Board. One of them was Mr. Leonard Wilkinson who was elected a Director in the place of Mr. Pigou who died shortly before their last meeting; and in the place of Mr. T. H. Goodwin Newton (whose failing health had obliged him to resign his seat at the Board), they had elected his son—a very promising young man, possessing plenty of ability and a knowledge of foreign languages. He (the Chairman) should like to say to those who did not know Mr. Goodwin Newton's services, that he was connected with the Association for 43 years. He was an Auditor in the first instance; and then for 39 years a Director. So that they might all well understand that he did very good service for the Association.

THE REMOVAL OF THE COAL-TAX.

Only the previous night, he had a very good piece of news. It was that Mr. Asquith, who had apparently listened to his (the Chairman's) remarks six months ago [laughter], had taken the 1s. tax off coals. As the Association shipped something like 262,000 tons to the Continent, the proprietors could easily calculate what this abolition of the tax would represent to them. He was afraid they would not benefit much this year, because the abolition did not come into operation until November, by which time all their coals would have been shipped to the Continent.

The DEPUTY-CHAIRMAN (Mr. Arthur Lucas) seconded the motion.

Sir JOHN RUNTZ asked whether the increase in the number of consumers, or a large percentage of it, was on the old area, or chiefly due to the districts over which the Association had laid new mains.

The CHAIRMAN confessed that Sir John's question was somewhat of a poser. However, he should think that most of the increase in the number of consumers was on the new mains. It was impossible to say exactly, because the increase was spread over the whole of the districts which the Association lighted. Naturally, the proportion of new consumers would be, except in isolated cases, greater on a given length of new main than on the same length of old main.

On the motion of the CHAIRMAN, seconded by Sir E. CHANDOS LEIGH, the dividend recommended in the report was declared.

Accompanied by complimentary remarks attesting the value of services rendered, resolutions were unanimously passed, re-electing the retiring Directors as follows: Mr. J. Horsley Palmer, on the motion of the DEPUTY-CHAIRMAN, seconded by Sir CHANDOS LEIGH; Mr. Robert Tyndall, on the motion of the CHAIRMAN, seconded by Mr. CORBET WOODALL; Sir Charles James Jessel, on the motion of the CHAIRMAN, seconded by Colonel LE ROY LEWIS.

Proposed by Mr. A. B. BOSHER, seconded by Sir JOHN RUNTZ, the retiring Auditor (Mr. M. Somes Pilcher) was reappointed.

The CHAIRMAN moved a vote of thanks to the Secretary, the Engineers, and the staff generally both in London and abroad. He said that a good many of their Engineers from the Continent were present that day because it was really the annual meeting of the Association; and the Directors took the opportunity of having them over to cross-examine them very closely regarding their "goings-on" on the Continent. He could assure the proprietors they had a splendid staff of men working in their interests.

Mr. J. H. BIRCHENOUGH, in seconding, said he did not think there was anything that gave the Directors so much pleasure as bearing testimony to the zeal and the public spirit of their staff both in London and on the Continent. A Company such as their own, carrying on business abroad was very dependent upon the faithfulness and the zeal of their staff; and year after year as he sat at the Board and visited the stations, he was more and more impressed with the service of their representatives on the Continent.

The motion was agreed to with great cordiality.

Increase of Capital.

An Extraordinary Meeting was then held for the consideration of the following resolutions:—

1. That, in pursuance of the statutory power of the Association in this behalf, the nominal capital of the Association be increased from £3,800,000 to £4,940,000 by appropriating for this purpose £1,140,000 from the sum or sums applied from time to time out of revenue to the extension and improvement of the works of the Association, and to other purposes to which capital was properly applicable.
2. That the increased capital of £1,140,000 be issued in the form of capital stock ranking *pari passu* with that already issued, and be allotted to the present proprietors, free of cost, in proportion to their holdings, at the rate of £3 for every £10 now registered in their names, and that this increase do take effect on the re-opening of the register of transfers of capital stock on the 2nd inst.
3. That the capital stock be transferable, on and after the said 2nd inst., in multiples of one pound, instead of multiples of ten pounds as at present.

The CHAIRMAN said he had no doubt the proprietors would expect from him a few words in explanation of these resolutions, which he proposed to put *en bloc*. The meeting was called in conformity with the Association's Special Act of Parliament of 1878, clause 3; and the allotment followed the precedent of 1883 with certain differences. In 1883, the Directors distributed among the proprietors 25 per cent. of the amount of stock which they then held, increasing the capital by £700,000. On this occasion, the Board proposed to distribute 30 per cent., or £1,140,000. In 1883, there was a system of issuing scrip certificates for fractions of £10—that was to say, of £2 10s., to overcome the rule relating to multiples of £10. They, however, experienced the greatest difficulty in calling in all of these for registration—in fact, the last of them were only deposited for registration last year, or 22 years after they were issued. To overcome this difficulty, it was proposed, on this occasion, to do away with the £10 multiple restriction, and to register all amounts which did not include fractions of pounds. He believed this would meet with great approbation among the proprietors, who generally wanted to invest very closely all the money they had available; and he knew that many members of the Stock Exchange had written to the Board on this subject. They could not take fractions of pounds; but they were prepared in future to take pounds as their transfers. The figure mentioned, as he had told them, amounted to 30 per cent. of the capital. Each holder on the register would therefore receive £3 additional stock for every £10 he or she now held, *without* payment of any kind. He emphasized this, because many ladies had written to ask when they would have to pay the £3. The additional stock would be identical in all respects with the existing stock; and no money would be payable. The precedent of 1883 would be followed; and no allotment letter would be issued. But upon the resolutions being passed, the shareholders would be credited with their proportion on the 2nd of May; and it would be transferable in exactly the same way as the existing stock. The certificates would be posted as soon as they were ready. This brought him to a very important matter regarding the dividend. Following the precedent of 1883—when, after the increase of the capital, the rate of dividend fell from 12 per cent. to 10 per cent.—the rate of dividend the Board would propose in the near future, if the results of the working should justify it, would be 8 per cent. per annum on the increased capital of £4,940,000, as against 10 per cent. on the present amount of £3,800,000. The effect of this would be that £15,000 more would be divided than at present. To put it in other words, the holder of £100 of stock would now receive £10; but, on his increased holding of £130 of stock at 8 per cent., he would receive £10 8s. This had not been understood by a great many people; but he hoped, after the way he had now put it, it would be thoroughly understood. The proposition for dividend as he had explained it would be made at the next meeting, subject, of course, to the working of the half year to June 30 next. The sum of £1,140,000 was, as many of the proprietors were aware, the difference between the dividend they had paid and the net profit, and which had been put aside in the past 23 years for extending or improving their works. It was a system which had been in vogue with the Company for many years; and it had obviated the necessity for perpetually going to the proprietors to raise fresh sums of money whenever they required to enlarge or improve their works. This had worked admirably so far. He trusted the information he had given would be sufficient. The money was the proprietors' property; and it was being divided among them, not in the shape of dividend, but in the shape of a stock bonus. Some 1807 proprietors had already signified their approval of the Directors' policy; and those proprietors represented a total of £1,383,710 of stock. He need hardly say the Board would apply to the Stock Exchange to have this extra amount of stock quoted in the ordinary way; and they would also have to pay the sum of something like £3000 to the Government for stamp duty.

The DEPUTY-CHAIRMAN seconded the motion, which, after one or two inquiries had been made, was unanimously adopted.

Proposed by Mr. A. B. BOSHER, and seconded by Mr. T. WILKINS, a hearty vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN responded; and the proceedings terminated.

BOMBAY GAS COMPANY, LIMITED.

An Increased Dividend.

The Ordinary Meeting of this Company was held last Thursday at the London Offices, No. 6, Drapers Gardens, Throgmorton Avenue, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. J. H. Perrins) read the notice convening the meeting and the Auditors' report; and the report of the Directors and the accounts (which were noticed in the "JOURNAL" for the 24th ult., p. 255) were taken as read.

The CHAIRMAN remarked that he was bound to say he had never got up in that room under more serious and sad circumstances with regard to the constitution of the Board than he did at that moment, because, as the report would have told them, they had lost two of the very oldest members of it. The late Major Gordon had been a Director of the Company for 42 years; and, if not an original Director, he must have joined the Board very soon after the formation of the Company. Mr. Flinders was for a long period Auditor, and afterwards was for a few years a member of the Board. With regard to both these gentlemen, the Company had lost men who gave the very closest attention to their duties; and the Board felt that they had lost cordial friends and most loyal colleagues. He himself would never fail to regard the death of these two gentlemen as a personal loss; and as one got on in life, one missed old associates in a manner that perhaps the younger men did

not. Passing from that matter, he had the gratification to inform the shareholders that, in dealing with the vacancies thus created, the Board had been able to bring to their counsels men who he thought they would agree with him would not only be a great addition of strength and of stability to the Company, but would really give it distinction. The Directors appointed to the first vacancy, Mr. W. G. Bradshaw—a gentleman with whom City men would probably be most familiar as the Deputy-Chairman of the London City and Midland Bank, and who was also (as his father and grandfather had been before him) Chairman of the Commercial Gas Company. Those who were fortunate enough to be shareholders in the latter Company would have heard the masterly, lucid, and complete manner in which he was able to deal with the accounts of that large undertaking. He (Mr. Jones) congratulated the shareholders on having at their Board a man of such promising antecedents. The other gentleman who had been appointed was a veteran in gas management—Mr. Charles Hunt, who was for very many years the Chief Engineer of the great Birmingham Corporation gas undertaking. His name was a household word among gas people; and they might all congratulate themselves on having at the table the ripe experience and great judgment with which Mr. Hunt had conducted a long and very successful career. He was sure the shareholders would agree with him that, in the selection of these two gentlemen, if the Board had searched all London through, they could not have done better for the interests of the Company. Turning to the business of the past year, the report told the shareholders—what was perhaps the most pleasant fact of all—that the Directors were able to ask the shareholders to authorize an increase in the dividend. Now this increase was only a return to the dividends paid some years ago, though for the last five years they had had to be content with a smaller rate, owing to the price of coals, the plague in Bombay, general slackness of trade, and other circumstances of the kind. It was very gratifying to the Board to be able to increase the dividend; and he thought if the shareholders looked at the position of their undertaking in the stock lists, they would find nothing of which to be ashamed. Indeed, as gas shareholders, they must rejoice to see that the whole of the gas industry stood so well in the public estimation. The Board would not have recommended any increase in the dividend but for the fact that last year they obtained the consent of the shareholders to the lowering of the price of gas in Bombay. Though they did not lower it by a very large sum off the total price—which was over 6s. per 1000 cubic feet—this was a step in the right direction; and he would tell the proprietors that it was the policy of the Board to get out of the rut in which the Company had run for many years—for it was over twenty years since the last reduction in price was made. This was a very long stage in the history of a gas company; and he would have been ashamed to have been connected with the undertaking much longer, if some reduction had not been made. The Board had decided to strike out in the same direction that had proved so successful at home—they were going to endeavour to induce the poorer people to become consumers of gas by means of the prepayment meter. This system had wrought such an extraordinary change upon the business of many English gas undertakings that he had always felt—and he believed he might say the Board all agreed with him—that if there could possibly be room for it in Bombay, they would not be justified in omitting to try it. It had been said that the habits of the people did not lend themselves to this sort of thing. Well, had he heard this story on other Boards with which he was connected, and had persisted, and his colleagues had persisted, in trying the system; and the trial generally resulted in success both in England and abroad. At any rate, they meant to go upon these lines; and as they had unfortunately, owing to the illness of their Manager, had to send out a new one, they had impressed the matter upon him in the strongest fashion. In fact, they had even gone the length of making his emolument depend upon the increase in the sale of gas in Bombay. With regard to the new ten years' contract for the public lamps, it was very satisfactory to know that so large a part of their income was secured—that was, so long as they could show the Municipality that gas was in Bombay, as they knew it to be in London, the very best, and most approved, and most successful and cheap method of lighting the streets. They were lighting them very well now. As he had told them last year, an Australian Gas Engineer whom he had met had told him that, having passed through Bombay, Vienna, Paris, and Berlin, he had found Bombay to be the best lighted of all. This, of course, was on the incandescent system; but that system was even now improving, and it was the wish, and the intention, of the Board that their Managers should keep abreast of the times. They would then show the Municipality that, not only were they wise to make this contract, but in a few years they would be still wiser to confirm it. They would probably have the usual competition of electricity; but in this connection he might refer them to what had been published in the papers during the present week in London—that the Marylebone municipal authority, who only a few years ago were condemned to invest some 2¾ million pounds in the electric light undertaking, had been considering a recommendation of their Lighting Committee that they should light Oxford Street by gas. Large owners of electricity works as they were—unfortunately large for them—they had nevertheless got this recommendation before them. The Directors would do all that in them lay to convince the Municipal Authority of Bombay that gas was the very best and cheapest and most effective system of lighting. He would just turn for a moment to the accounts. They would see from the report that there had been a slight increase in the sale of gas; but owing to the reduction in price, this did not show in money on the balance-sheet. They would find there was a difference of about £2400 in the receipts for gas for private lighting; but the public lighting receipts had gone up, because, though the rate was a good deal cheaper, the quantity of lighting had increased in the meantime. The cost of coal was £1290 more; but the receipts from residuals had gone up £999 odd; so that they had not lost very much there. Another feature which he thought would give the shareholders satisfaction was that there was no material increase in the capital account. The construction account stood at identically the same figure as last year; and this had been secured with the assistance of the revenue account. Though some very important mainlaying work was carried out, they were able to charge it to revenue, instead of increasing the capital account, which they were very anxious to keep down. The charges for manufacture, distribution, and things of that sort, were slightly higher, in consequence of the increase in the sale of gas; but when this was all allowed for, there was a profit left for the year of £16,005, which, together with the amount brought forward from the previous year, enabled the Board to recommend the dividend they did—that was, a dividend (supplementing the interim dividend which the shareholders had already received) of 3½ per cent., free of income-tax, making 7 per cent. for the year. This would leave £3363 to be carried forward to the current year. For the preceding five years, as the report told them, the dividend had been at the rate of only 6½ per cent. It had been suggested to him that he should call the attention of the shareholders to the fact that their contract for the lighting of Bombay for ten years was subject to the power, by paying forfeitures, of renunciation by the Municipality at intervals during its progress; but this was clearly a proposal that they should not with any strength contend against, because it simply meant that if the Municipality could find anything better or cheaper they should be allowed to do so. The point of his observations to the shareholders a few minutes previously was that they knew the only cheaper system would be by some improved method of consuming gas, and not by going away from the use of it. He concluded by moving the adoption of the report and accounts, and the payment of the dividend.

Mr. LOUIS PENNY seconded the motion.

Mr. ENNIS said he was very glad indeed to note the progress which they were making in Bombay; and he felt that the Directors were entitled, first of all, to the shareholders' sympathy on the sadly depleted Board, and, secondly, to their best compliments on the effective recomposition of the Board. He had a slight acquaintance with Mr. Bradshaw; and he felt confident that his accession could only bring strength to the Company. He was sure also that Mr. Hunt's appointment would be equally welcome to the shareholders. The proprietors were glad of the little additional dividend; but, of course, the reserve must be thought of. It was not very large.

Mr. W. CUFF said there was one question he would like to ask. He noticed that the cost of maintenance of mantles had disappeared from the credit side of the profit and loss account. He presumed that it had been included in the items of manufacture or distribution.

The CHAIRMAN replied that the amount had not been charged on the debit side. This year they had net figures in the accounts; whereas on the previous occasion the gross figure was shown, and then the deduction made.

The motion was carried unanimously.

The retiring Directors, Mr. H. E. Jones and Field-Marshal Sir Evelyn Wood, V.C., G.C.B., were then re-elected—the former on the motion of Mr. PENNY, seconded by Mr. CHARLES HUNT; and the latter on the proposition of the CHAIRMAN, seconded by Mr. W. G. BRADSHAW.

The Auditors (Messrs. Magnus Ohren and G. E. Robinson) also retired. Mr. Ohren did not seek re-election; but Mr. Robinson was reappointed, There were several candidates for the vacant position; and after a show of hands, Mr. S. Gore-Browne (proposed by Mr. Robinson and seconded by Mr. Lowndes) was declared elected.

Mr. CUFF proposed a vote of thanks to the Chairman and Directors, Mr. HIND seconded, and it was unanimously carried.

The CHAIRMAN said it was a pleasant ending to a meeting of this sort when the shareholders could unanimously express their confidence in the Board. He should like also to add to the vote Mr. Perrins, their Secretary, and the staff in India, who had a good deal of responsibility.

Mr. PERRINS briefly returned thanks on behalf of the management, staff, and himself; and this concluded the proceedings.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

Carburetted Water-Gas Plant as an Aid in Composing Labour Difficulties.

The Annual General Meeting of this Company was held last Thursday, at the London Offices, No. 1, East India Avenue, E.C.—Mr. J. C. IM THURN in the chair.

The SECRETARY (Mr. J. M. Macmorran) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said he regretted to have to inform the shareholders that their Managing-Director (Mr. F. J. Heseltine) was unable to address them that day owing to illness; and, although he was glad to say Mr. Heseltine was much better, he was unable to be present. Regarding the report and balance-sheet, he (the Chairman) thought that these would be received by the shareholders with satisfaction. It would be noted that there was to the credit of the revenue account the sum of £76,920, made up of £59,526 net profit for the year, and £17,394 brought forward from 1904. This profit showed a falling off from last year owing to two causes: (1) The higher cost of labour; and (2) the extra expenditure entailed through the change of Engineers, including many alterations and improvements in the works. As to the first, the labour market in Argentina had been in a very disturbed state; and they had had to bear the consequences of a serious increase in wages as the result of the strike to which allusion was made at the meeting last year. The Directors determined to provide such means of combating sudden strikes as would prevent the Company being placed at the mercy of labour propaganda; and they therefore contracted for and erected a large carburetted water-gas plant—a plant which required comparatively little labour. It was fortunate they did so, for this plant was only just completed when the Labour Unions made such extravagant demands that, had the Directors given in, the Company would have been very much prejudiced for the future. They rejected the demands, and the whole of the workpeople stopped work at an hour's notice. Thanks to the water-gas plant, the energetic action of the management, and the assistance rendered by the

Government, they were able to completely frustrate the machinations of the labour agitators; and in eleven days they not only gained a complete victory, but replaced the bulk of the strikers by outside labour. Their Company was especially marked out for attack; and, in acting as they did, the Directors were fighting the battle of the whole gas industry in Buenos Ayres. This, of course, entailed expense on the Company; but the result was well worth the cost, as the Board believed similar strikes were unlikely to recur. He should like to place on record the appreciation of the Directors of the services of the staff in what, but for their strenuous efforts, might have been a serious matter for the Company, and for the whole of the industry in the city. They desired also to record their thanks to the other Gas Companies for their moral support. As to the second cause to which he had referred, the new Engineer found it necessary to recommend many changes and improvements which had been, and were being, carried out. Of these improvements, they had not so far reaped the benefit, as they were not yet completed. He need not take up much of the time of the shareholders by referring to the figures in the balance-sheet, which were clearly set out. The Directors had appropriated £76,920 in the following manner: To the 4 per cent. debenture interest, £10,000; to the interim dividend of 3 per cent., £18,000; and to the amortization of expenses on the debenture issue, £2112; leaving only £4224, which would soon therefore disappear. This left £46,808 for distribution. It was proposed to pay a final dividend of 4 per cent., making, with the 3 per cent. interim dividend, 7 per cent. (or 14s. per share) for the year, free of income-tax; and to place £2258 to the capital reserve account—leaving £20,550 to be carried forward. Out of the year's revenue, £23,683 was expended on the upkeep and renewal of the mains, works, &c., as against £19,333 in the preceding year. This amount would perhaps strike some of the shareholders as large; but he might explain that the amount expended in renewals this year was large, consisting, among other things, of the reorganization of the mains within the works, which absorbed a considerable sum, and which they preferred to charge to revenue. The Directors proposed, as would be seen, to carry forward a larger sum than formerly, for the reason that they considered their reserves were ample, amounting as they did to over £100,000, irrespective of the carry-forward. The new offices at Alsina had now been completed, and had been for some time in occupation. The increased workshop accommodation ought to tend to efficiency and economy in new work and repairs. The Directors had written off completely the cost of the old building. With the report and balance-sheet, the Directors sent to each shareholder a copy of the report and balance-sheet and the Chairman's speech of the South Barracas (Buenos Ayres) Gas and Coke Company, Limited, because at the present time their own Company held the whole of the issued capital of the South Barracas Company—viz., 12,000 shares of £10 each. It would be seen that the reserve fund was no longer invested in the business of the Company, but was an actual dividend-paying investment outside, although connected with their own Company. In view of the fact that, as the shareholders were aware, the South Barracas Company were about to issue another 3000 shares in order to provide for their further capital expenditure, the Directors had been considering the best means of dealing with this; and they were of opinion that this Company should take up these shares, and so maintain their control until such time as the South Barracas Company had been further developed. In this connection, and in view of the extensions in contemplation, the Board proposed that the capital of the Company should be increased to £700,000 by the issue of 10,000 ordinary shares of £10 each; these shares to be offered for subscription to the present shareholders at par, *pro rata* to their holding. With this view, if the shareholders approved the suggestion, the Directors would call them together at an early date to pass the necessary resolution in accordance with the Articles of Association. Their Secretary (Mr. Macmorran) visited Buenos Ayres during last year; and his report on the value of the South Barracas property was fully borne out by the latest returns the Directors had received. During the year, they secured from the Municipality a further contract for public lamps; and at Dec. 31 last they had 6837 in use—an increase over the previous year of 439 lamps. He was pleased to inform the shareholders that at the present time they had not a single public lamp with an open-flame burner—the whole having been converted to incandescent light, and paid for by the Company out of revenue. The number of cooking-stoves and heaters placed continued steadily to increase; and all that was possible was being done to foster this branch of their business. Of course, it was not nearly so remunerative as the lighting; but, at any rate, they were practically free from competition by electricity in this branch. With regard to the general prospects of the immediate future, he was glad to say that the city of Buenos Ayres continued to grow; and if they might augur from the general prosperity, they might hope that their business would continue to expand, and give good results. Their relations with the Municipality and other authorities, the Board were pleased to say, remained cordial. The Chairman then formally moved the adoption of the report and the declaration of a dividend at the rate of 7 per cent., free of income-tax, less the interim payment of 3 per cent.

Mr. Ross Pinsent seconded the motion.

Mr. J. Bennett asked whether the Chairman could give any information as to the financial effects of the strike.

The Chairman replied that the direct and indirect prejudice would certainly come to several thousands of pounds. It was, however, rather difficult to put it at any precise figure. They had really had two strikes—one the year before last, and one last year. Unfortunately, in the previous strike the Company had to give in, and the wages were increased, because the Company were not sufficiently sure of their ground to further resist the men. But on the last occasion they had the carburetted water-gas plant, which the Board considered untied their hands, and allowed them to arrange fully and fairly with their workmen. But there had been an increase of wages due to the strike and general labour disturbances in the River Plate. They were not the only Company who had suffered from this; and the cost might in their case, as he had said, amount to several thousand pounds.

In response to further questions both by Mr. Bennett and Mr. J. H. Robinson, the Chairman and Mr. Ross Pinsent gave additional information explaining the relations of the Company with the South Barracas Company. The Buenos Ayres (New) Company hold the whole of the shares, on which a dividend of 5 per cent. was paid last year, although, had it been politic to do so, more could have been paid. Of late years the business has developed rapidly, and promises to continue to do so in the future, especially seeing that this suburb of Buenos Ayres is likely to develop considerably owing to arrangements now in progress for the improvement of the water supply in the district.

The motion was unanimously carried.

Mr. Ross Pinsent, in moving that Mr. J. C. im Thurn be re-elected a Director of the Company, said it was a fact that the property of the Company had been bound up for many years with the Chairman's house of business. They years ago reconstructed it at a time when it was in considerable difficulties, and carried it through those dark years of the Baring crisis when things in Argentina were at their lowest.

Mr. Robert Nesham seconded the motion, which was unanimously agreed to.

Proposed by Mr. F. C. im Thurn, and seconded by Mr. Pinsent, Mr. Nesham was also re-elected to his seat at the Board.

The Auditors (Messrs. Turquand, Youngs, and Co.) having been reappointed, the customary complimentary votes of thanks were passed to the Managing-Director (Mr. Heseltine) and the Directors, and to the Local Committee and staffs in London and Buenos Ayres.

SOUTHAMPTON GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday—Captain A. J. Corse Scott, J.P., in the chair.

The Secretary (Mr. E. W. H. Eady) having brought up the minutes of the previous meeting, they were taken as read, as were also the report of the Directors and the statement of accounts for the six months ending the 31st of December. The report set forth that there had been an increase of 5,350,000 cubic feet of gas sold, as compared with the second half of 1904. This the Directors regarded as a satisfactory indication that the extension of the Company's business in the outlying districts had been sufficient to more than compensate for the reduction caused by the almost universal use of the economical incandescent mantle. The number of consumers on the prepayment meter system amounted to 12,500; being an increase of 500 in the half year covered by the report. The profit and loss account showed that, after payment of the debenture interest and all other charges, the amount available for distribution was £18,956; and the Directors recommended the payment of maximum dividends, amounting to £12,438 on the ordinary stock, less income-tax. This left £6518, from which £4000 had been invested to augment the reserve fund; and the balance (£2518) was carried forward.

The Chairman, in moving the adoption of the report and accounts, expressed the pleasure of the Directors at their satisfactory character. The amount of profit available was £18,956, which was £6518 more than was required to pay maximum dividends. The Directors had, therefore, been able to augment the reserve fund to the extent of £4000. During the half year, 320 million cubic feet of gas were sold—an increase of nearly 5½ millions over the corresponding period of 1904. This must be regarded as satisfactory, bearing in mind the fact that the June half of 1905 showed a decreased sale of 2 million cubic feet. The increase in the number of consumers was fully maintained; being 155 of the ordinary and 500 of the prepayment class. The Company were now supplying gas to 21,000 consumers. The number of gas-stoves let on hire up to the present date amounted to 340; being an increase of 283 over the corresponding period of 1905. This was a satisfactory addition to a new branch of the Company's business. The use of gas-cookers continued to be as popular as ever, and it had been considerably enhanced by the free cookery demonstrations given at the recent gas exhibition, which had already resulted in a further demand. At present, upwards of 14,500 cookers were in use in the Company's district. Satisfactory progress had been made with the Bill of the Company before Parliament, which the Directors were pleased to report was now unopposed.

Mr. Moberly seconded the motion; and it was carried unanimously.

The dividends recommended by the Directors having been declared, Mr. R. C. S. Pearce and Mr. C. Crowther Smith were re-elected Directors and Mr. F. J. Burnett an Auditor of the Company.

On the motion of the Chairman, seconded by Mr. Moberly, the salary of the Secretary was increased by £100 per annum.

Mr. Eady returned thanks, and assured the proprietors that his best services should be given in the interests of the Company.

A vote of thanks was accorded to the Chairman, and a similar compliment was paid to the Secretary, the Manager (Mr. S. W. Durkin), and the staff.

Proposed Reduction in Price Negatived at Halifax.

At the Monthly Meeting of the Halifax Town Council last Wednesday, Mr. J. Collinson, the Chairman of the Gas Committee, moved that the price of gas used for all purposes, except for engines, be reduced as follows: In the borough, from 2s. 3d. to 2s. 2d. per 1000 cubic feet; out of the borough, from 3s. 1d. to 3s.; and gas supplied through prepayment meters, from 2s. 9d. to 2s. 8d. A revised scale for gas supplied exclusively for engines was also recommended. He said the object of the proposed reduction in price was to meet competition, and to increase the output at the gas-works. The Committee proposed to concede £4331 to the consumers. This was equal to a rate of 2½d. in the pound; and it would be a set-off to the recent increase of 6d. in the pound on the borough rates. The estimated profit for the coming year was £6000. The resolution was opposed on the ground that there was no guarantee that extra consumption would be secured, and that an experiment which would bring benefit simply to gas consumers ought not to be made at the risk of the ratepayers. The proposal was rejected by 27 votes against 17.

PRICE OF GAS AT HUDDERSFIELD.

Reduction for Power and Manufacturing Purposes.

The report of the Gas Committee which was submitted to the last monthly meeting of the Huddersfield Town Council recommended that the price of gas for motive power and business purposes should be reduced to 1s. 6d. per 1000 cubic feet, as from the 1st ult. The total receipts for the year to March 31 were £100,641, as compared with £100,826 for the previous twelve months. The expenditure amounted to £69,099, to which had to be added £13,908 for interest and sinking fund; making £83,007. Then £7194 was transferred to discharge the balance of the reconstruction of works account, and £6823 to depreciation account; leaving £3617 (or equal to 2d. in the pound) to go to the relief of the rates. For the previous year the expenditure amounted to £70,066, and the interest and sinking fund charges to £14,562; making a total of £84,628.

The adoption of the minutes having been moved by Alderman Jessop, an amendment was proposed by Mr. Whiteley that the question of reducing the price for motive and manufacturing purposes be referred back to the Committee. He said the proposed concession would mean anything up to £5000; but it was because of the principle involved that he moved the amendment. The gas cost about 1s. 11½d. per 1000 cubic feet to produce; and it was sold at three or four different prices. The prepayment and ordinary consumers paid 2s. 6d. per 1000 cubic feet; the charge for cooking purposes was 2s. 1d.; and now it was proposed that for business purposes 1s. 6d. should be the rate. Out of 25,000 consumers of gas, 12,713 had prepayment meters; and nearly all of them also possessed stoves. The difference paid by the 12,713 people was 1s. per 1000 cubic feet—a very large difference, and one which the ratepayers would not be prepared to accede to if they were given the opportunity of expressing their opinions. He contended that the quality of the gas was gradually going down, and that the proposed reduction would have a further effect in this direction. The producers should be considered as well as the consumers. There were employees in the Gas Department who were getting 22s. 8d. per week. He understood that the question of wages was to be considered when the Committee knew where they were financially; but they must have carefully gone into their financial position, or they were unwise in proposing this reduction in price. He would be told that the proposal was made in order that they might compete with suction gas; but in his opinion different methods should be adopted.

After several members had spoken, Mr. Dawson, as one of the members of the Sub Committee who had considered the question, said it would be a wise and profitable business to sell gas to manufacturers during the day at 1s. 6d. per 1000 cubic feet. There would be no loss, but an actual profit. He reminded those who were always finding fault with capitalists—many of whom had risen from the ranks, and had struggled hard with hand and brain to make headway—that they had to meet competition in the open market. One of the Committees of the Corporation had been to the Gas Committee with a view to obtaining gas for motive power; and a bargain had been struck. If they would do this for a Committee of the Corporation, who had no competition to contend with, surely they were going to stand by those who found work for the people who had penny-in-the-slot meters. If work was not found for these people, there would be no pennies to put in the slots. They had lost some of their customers by sticking to the high price for manufacturing purposes; but they hoped that extra gas would be consumed if the charge was lowered.

This was described by Mr. Pickles as the "Capitalist View" of the matter; and he argued that if the Corporation could sell gas at 1s. 6d. and make a profit, those who were paying more were being robbed. It was obvious, he added, that the poor man was going to make the profit, by being charged heavily for his gas, so that another might have a cheap supply. The Mayor (Alderman Broadbent), however, remarked that he could not allow it to go to the public that any Committee of the Corporation had taken up an attitude such as the one described by Mr. Pickles. It was not right to say that there had been some sort of conspiracy to give much to the rich and little to the poor. He must say that it was deeply painful to know that a member of the Corporation, even of such short standing as Mr. Pickles, had for a moment thought that any Committee could take up such an attitude. The question of the price of a commodity like gas was by no means so easy to settle as Mr. Pickles and his friends seemed to assume. He ventured to say that, as between man and man, it was as fair to charge the user of a gas-engine 1s. 6d. as it was to charge an ordinary consumer 2s. 6d. It was his conviction that, if they charged a manufacturer for his gas-engine as they charged the ordinary consumer for light, they were doing a gross injustice to the manufacturer. In his opinion, the Gas Committee were on the lines of demonstrable fairness as between one class of consumer and another. The Capitalist and Labour question had nothing to do with it.

After some further debate, Alderman Jessop, in reply, said that the discussion had arisen from the fact that the wage question was at the bottom. They intended to deal with this question, as they always had dealt with it, in a straightforward and honourable manner. The fact that the prices of gas to penny-in-the-slot consumers had only recently been reduced, had been carefully avoided. The prices were reduced last year to the tune of between £2000 and £3000. The Committee had considered this question very carefully; and if the resolution was referred back twenty times, it would come again to the Council in exactly the same form as that in which it appeared that day. Reductions similar to the one now proposed had been made in such towns as Sheffield, Stockport, Halifax, Nottingham, Birmingham, and Leicester. Not only did it pay, but it was also better for the staff of men employed, because they had a day-load constantly on. If the machinery was more evenly employed, it was better altogether for the concern from a commercial point of view. They expected, from the experience of other towns, that, instead of a loss of £5000, the income and the consumption would be increased by this reduction. The recommendation did not include business men who had asbestos fires, as in that case two meters would be necessary. The proposal would apply in a common sense way to all businesses; but it would have to be left to the discretion of the Engineer (Mr. E. A. Harman).

For the amendment only the five Labour members voted; and it was lost by an overwhelming majority.

SLOT-METER INSTALLATIONS AT STOCKTON.

No More to be Put in.

After considering a report upon the matter, the Stockton-on-Tees Town Council have resolved not to put in any more slot-meter supplies, and also that the quantity of gas furnished to the present prepayment consumers shall be reduced from 30 to 27 cubic feet for 1d. The number of installations at March 31 last was 4315; and the total cost (including the outlay on meters, stoves, grillers, brackets, burners, service-pipes, and wages) was £10,946. Of the 4315 installations, no less than 2695 were put in during the past twelve months; and hence a full year's experience of the consumption of the largest proportion of them was not available. For the purposes of the report, however, the Gas Manager (Mr. W. Ford) and the Borough Accountant (Mr. John Reay) took a number of the older consumers of the three classes who were using gas prior to March 31, 1905, and ascertained the actual receipts from them during the twelve months ended Dec. 31, 1905. But they point out that, in their opinion, it would not be altogether safe to take this as a fair criterion of the consumption and revenue of the whole of the slot meters now in use; the facilities and privileges granted a year ago having no doubt prompted a class of consumer to apply for all the fittings it is possible for him to obtain, but who will not use them to such an extent as the earlier consumers. The average consumption of gas by each consumer during the year was: Ordinary, 8000 cubic feet; with griller, 8750 cubic feet; and with stove, 14,400 cubic feet. The average price of each installation was: Ordinary, £2 19s.; with griller added, £3 6s. 10d.; with stove added, £4 17s. 6d. Reckoning the cost of gas manufacture at 1s. 5d. per cubic feet, 10 per cent. on the cost of the installation for redemption, and 3½ per cent. for interest, the average profit on the three kinds of installation is shown to be a trifle over 5 per cent. From this, however, it is pointed out, must be deducted the slot installation's share of the redemption of the works and plant, which is 1½ per cent.; and this leaves a net profit of 3⅜ per cent.

When the matter came up for consideration, Mr. Stewart contended that slot-meter users generally were paying more in proportion for their gas than ordinary consumers. Thus, they paid £5900 for 43,150,000 cubic feet, while ordinary consumers paid about £1500 less for the same quantity of gas. Alderman Cameron said that, since the Committee meeting, he had gathered from Mr. Ford that he personally favoured the continuance of the slot-meter installations; and as he had great respect for Mr. Ford's judgment, he thought the question should be further considered by the Committee. Alderman Bainbridge thought Mr. Stewart had made out a good case for the slot-meter consumers. Until that evening, he (the speaker) had been under the impression that the cost of installation was so heavy that the slot meters were being put in at a loss. It appeared, however, that this was not the case. Alderman Harrison admitted that, disregarding the redemption of the works and plant, there had been a profit; but he would point out that they had installed 2695 slot meters in twelve months, and he thought every business man would agree with him that it was time to cry a halt, and see to what extent the meters that had been put in were used before making fresh installations.

An amendment to refer the question back to the Committee was lost by a large majority; and the minutes were adopted.

THE GAS MANAGERSHIP AT HEREFORD.

Memorial from the Ratepayers.

At the Meeting of the Hereford Town Council last Tuesday, the Mayor (Mr. E. C. Gurney) stated that he had just received a memorial accompanied by a letter, which, with the permission of the Council, he would read. In it, his Worship was requested by the signatories not simply to present the memorial, but to see that both it and the names attached to it were duly read, as it was representative of the principal trade interests in Hereford. The letter continued: "The excellent service rendered to the city by Mr. Parlby, and the sense of honour and the devotion with which he has served our interests so long, are matters well known to your Worship; and we trust, therefore, that your great influence in the Council may be exerted in our behalf. The memorial, which bore 61 signatures, was as follows:—

To the Mayor, Aldermen, and Councillors of the City of Hereford,

Gentlemen,—We, the undersigned ratepayers of the city of Hereford, desire to approach you respecting the resignation of your Gas Manager, Mr. Parlby, which is due to take effect next November. Nothing but a deep and profound sense of duty impels us to request a careful and generous review of the facts which led up to it, together with the quality of the work he has rendered during the twenty-one years he has managed your gas-works. As an official, he has been regarded as exceptionally able, conscientious, and devoted, initiating and carrying out many paying reforms. In fact, during his term of office the debt on the gas-works has been extinguished, the price of gas considerably reduced, and the works materially improved and kept up to date. As a man, his character and reputation have been all you could desire, without spot or blemish. We keenly feel that this is one of those cases in which justice might be met and the quality of mercy not strained by asking your Gas Manager to withdraw his resignation.

As the matter was about to be passed by without notice, the Deputy-Mayor (Alderman Wilts) asked permission to make a few remarks. He said he hardly thought they should receive a memorial like the one before them without some reference being made to it. He was quite sure that, in regard to Mr. Parlby himself, each member of the Council

could, and would, endorse everything that had been said in the memorial, and would all receive it with the respect due to the names upon it. Mr. Boycott, rising to a point of order, said it was quite irregular that they should start anything which would involve a discussion by the Council on a matter of which there was no notice of motion. The Mayor said he thought the subject could not be dealt with that morning; it ought to stand over. After some remarks by various members, Mr. Bulmer said that, in order to enable the Council to deal with the memorial, he would move that it should lie on the table. Mr. Boycott thought this was the proper course to pursue; and therefore he would second the motion, so as to enable any member who considered that on a former occasion the Council were wrong in accepting Mr. Parlby's resignation to take proper action at the next meeting. It would have been more satisfactory to have had before them a list of the people who refused to sign the memorial. In answer to a question, the Deputy-Mayor stated that a successor to Mr. Parlby had been advertised for. Eventually, the motion was carried unanimously.

REDUCTION IN PRICE AND POWER AT LEEDS.

At the Meeting of the Leeds City Council last Wednesday, Mr. G. Ratcliffe, the Chairman of the Gas Committee, brought forward a resolution that from July 1 the Council should fix the standard of illuminating power of the gas at 15 instead of 18 candles; and that in the city the price should be reduced from 2s. 3d. to 2s. 1d. per 1000 cubic feet to consumers by ordinary meters, from 2s. 6d. to 2s. 4d. to consumers by automatic meters, from 2s. 9d. to 2s. 7d. to consumers by automatic meters with cookers, and from 2s. 3d. to 1s. 10d. to consumers for power purposes. The reduction to the consumers outside the city would be: Ordinary consumers, from 3s. 1d. to 2s. 11d.; consumers for power purposes, from 3s. 1d. to 2s. 8d. Mr. Ratcliffe said he did not think there would be much, if any, criticism of the proposal to lower the illuminating power. The almost unanimous opinion of the country was that it was a mistake to make a high candle-power gas. A 15-candle gas was as good for incandescent lighting as an 18-candle gas. The department intended to provide mantles and chimneys and renew them, making fortnightly calls, and keep the burner in perfect order, for the sum of 10d. per burner per quarter. They hoped to do this without any increased cost or loss. In the Leeds Consolidation Bill, the Corporation asked for a 16-candle gas; but the Committee suggested that they should take 14 candles, and they did so. Over 300 towns and cities had gas of 15 candles or lower. The question might be asked, If you have a 14-candle standard, why do you recommend a higher one? The reason was that they could make a 15-candle gas without any enrichment at all. By lowering the standard from 18 to 15 candles, the department would save 1½d. on the 3 candles; and they proposed to give this to the consumers, as well as an additional ½d. He felt sanguine that the profits for 1905-6 would not be lower than the £18,000 which they had guaranteed to the Finance Committee.

An amendment was submitted by Mr. Clarke that the prices to be charged to users of gas by automatic meters should be reduced to the same level as those to be charged to ordinary consumers. It was, however, lost, and the Gas Committee's proposals were agreed to.

GAS-WORKS RESULTS AT ROCHDALE.

As has already been stated in the "JOURNAL," the profits on the past year's working of the Rochdale Gas Department amounted to £17,692, as compared with £19,598 a year ago; and the Committee have decided to recommend the Council to place £5000 to the reserve fund and devote the balance of £12,692 to the relief of the rates. A year ago the whole of the profit was given to the rates. In 1904, the amount devoted to this purpose was £13,000; but the Council then took £5228 from the reserve fund to meet the cost of street lighting, which came into the accounts for the first time.

The receipts from all sources during last year amounted to £85,134—a decrease of £1425 on the preceding twelve months, which is accounted for by the reduction of the price of gas. The expenditure was £67,441—or an increase of £480. On public lighting the outlay was £5678, against £5478 in the previous twelve months. The stock of coke has on the present occasion been taken into account for the first time, and amounts to £700. At the beginning of last year the gas-works reserve fund stood at £17,199; but during the twelve months about £10,000 was taken from it to make payments in connection with the installation of the new water-gas plant. The fund now amounts to £7193; but there are still outstanding bills, amounting to nearly £2000, to be settled on that account, and they will further reduce the fund to about £5000. In spite of this, however, the Committee were by no means unanimous in their opinion that so large a proportion as £5000 of the past year's profits should be placed to reserve.

We have received from West's Gas Improvement Company, Limited, a new catalogue of retort charging, drawing, and discharging machines which they are now issuing. It is another example of the advance which has of late years been made in artistic printing; the illustrations of the various kinds of retort-house plant manufactured by the firm being presented most effectively. They occupy 30 oblong pages (10 in. by 12 in.), and they are followed by a series of general outline plans showing various arrangements of the machines illustrated. These, with the explanatory matter accompanying them, will be found most useful by managers contemplating alterations of carbonizing plant. That the firm are capable of undertaking large contracts is evidenced by the view of their extensive works at Miles Platting, which occupies the last page of the catalogue, in one corner of which is shown the London offices in Queen Victoria Street.

THE STEAM-ROLLER AND GAS-MAINS IN DUBLIN.

At the Meeting of the Dublin County Council last Thursday, Mr. Molloy, J.P., submitted the following resolution: "Owing to the Gas Company refusing to comply with the reasonable and necessary requirements of our County Surveyor, Mr. Collen, he is hereby instructed to discontinue steam-rolling any of the roads of the county where there is danger of injuring the gas-pipes; this Council having been compelled, under the existing law, to pay serious damages and costs in the legal cases brought by the Gas Company for injury to their pipes. The present law is antiquated, and quite unsuited to the proper construction and maintenance of public high roads for modern requirements." Mr. Molloy said the County Surveyor had required the Gas Company to lay the pipes at a certain distance below the surface of the road, so that they would not be affected by the use of the steam-roller. When a pipe was broken, the Gas Company sent in to the Council a bill not only for the damage to the pipe, but for the loss of gas through the leak. Mr. O'Farrell seconded the motion. Mr. J. Mooney said he did not think the Council should entertain such an idea for the sake of £25 or £30 a year, which would be the outside that any damage done by the steam-roller to the gas-pipes would come to. Mr. Collins supported this view. Mr. Mahony said he would be in favour of postponing the matter for six months in order to see what the cost of the breakages would really be. The Chairman (Mr. P. J. O'Neill, J.P.) said that within the last few months the Gas Company were claiming for leakage from broken pipes. To abandon the steam-rolling was the only course open to the Council. The disadvantages that would result would have such an effect on public opinion that if Parliament were asked to restrict the Company it would do so in a way that would enable the Council to maintain the roads efficiently. After further discussion, the matter was postponed for three months.

STAINLAND DISTRICT COUNCIL AND THE GAS COMPANY.

The Average Meter System.

The Chairman of the Stainland Urban District Council (Mr. H. A. M'Kenzie) has been giving the members some particulars with regard to a "little difficulty and dispute" with the Gas Company on the question of charges. He said the custom was to have meters affixed, not to each lamp, but at certain distances. At the end of the quarter, the register of all these meters was taken. The various registrations were added together, and then divided by the number of meters—thus getting an average for each one. This was considered to be the consumption of gas for the quarter for each lamp in the district. The average was multiplied by the number of lamps; and the charge was made upon that. No one needed telling that gas-meters did not always register alike. Though a lamp might be burning the same length of time, in some cases the meter would register more than in others. The Council had always held the view that an average should be taken from the registers of all the meters, added together. The Gas Company had, however, taken exception to this; and in one or two cases where the register of the meter had been a very low quantity, they had omitted to take it into account, thinking it was only fair to themselves. Others that had registered a great deal more than the average, had always been kept in. They had not been excluded, as not being fair to the Stainland ratepayers to put them in. His contention had been that they should abide by the arrangement with the Gas Company, and so take the good with the bad. In one case the Council refused to pay the account unless it was made out in this way. The Company agreed, and sent in an amended note, which was paid. In March last, the Company wrote, in reply to a letter from the Council, that "they had gone thoroughly into the question raised, and had decided to accept the conditions in the letter—namely, to charge for all gas consumed as registered by the meters and properly averaged." A corrected account on this basis was enclosed. Notice was also given that the gas supplied to lamps in the Stainland district in future would have to be taken through a separate meter for each lamp, for which rent would be charged. So that, after June 30, because they had insisted upon what they thought was fair and just between seller and buyer, they were to be mulcted in the extra cost of a meter for each lamp. They had a little time in which to consider the question before the next lighting season; but he thought the district would be inclined to go without gas lighting rather than submit to the charges indicated.

A PROSPEROUS YEAR AT ROTHERHAM.

Some particulars as to the Rotherham gas supply were given in last week's "JOURNAL," from the annual report of the Borough Comptroller and Auditor; and Alderman Gummer added some further information when moving the adoption of the Gas Committee's report at the quarterly meeting of the Borough Council. He said he regarded the working of the year as one of the best in the history of the undertaking. The sums appropriated out of profits, extending over a period of thirty years, amounted in the aggregate to £81,000. In 1875-6 the largest amount was handed over for the relief of the rates—viz., £4000. In the year just closed, the surplus was £5791. The Finance Committee had recommended that sums of £3260 and £1964 (the latter amount representing the cost of public lighting) be allocated from the profits of the past year for the relief of the rates. He considered the Corporation had been justified in the appointment of a new Manager (Mr. J. S. Naylor) twelve months ago. Dealing with the reasons for the better results, he mentioned that the sale of gas had increased by 10 million cubic feet. The preceding year was rather a bad one as compared with the year before that; and they had practically got back to the same state as 1904, when they were suffering from the competition of the electric light. A number of consumers were then leaving

the department; and they had the beginning of the bad trade which lasted so long. They were, however, now getting back some of the advantages. The sales amounted to 244¼ million cubic feet, against 234¼ million cubic feet in the previous year—being an increase of 4·28 per cent. The increased output he attributed to the use of automatic meters. The rate of increase in consumption by automatic meters had been 13 per cent.; and by ordinary meters, 1 per cent. The quantity of coal carbonized was 23,737 tons, as against 22,774 tons. The make of gas had been 280 million cubic feet, against 267 million feet—an increase of 13 million feet. Most works considered 5 per cent. increase satisfactory. Rotherham was accustomed to have rather more; but he regarded the increase as satisfactory. The leakage was equivalent to 11·56 per cent., against 11·29 per cent. The gas made per ton of coal was 11,796 cubic feet, against 11,702 feet. He attributed this partly to the fact that the candle power had not been quite so high as in the previous year. It had been a little over 15½ candles; but they had power to go down as low as 14 candles. No less a sum than £12,309 had been collected from the automatic meters during the year. The decreased cost of coal was £1031, notwithstanding that 963 tons more had been carbonized. The gross profit was £17,548, against £15,533; and the net profit, after allowing for interest, redemption, sinking fund, &c., was £7681, against £5629. He mentioned that there was already installed in the town a producer gas plant, and said that if this system was extended, it would considerably affect the Gas Department. During the year they had reduced the price of gas to from 1s. 9d. to 2s.; and he favoured the encouragement of the consumption of gas for power. With regard to the disposal of profits, he thought they should like to keep more for a reserve fund than they were doing. They could not expect the gas consumer to be continually relieving the rates. They were asking the consumers to pay the rates of other people. It appeared to him that the time had come when they should give some relief to the users of gas. He thought the Committee might consider this question in the near future. He bore testimony to the excellent management of Mr. Naylor and the staff.

LONDON COUNTY COUNCIL.

Incandescent Gas Lighting for Schools and Bridges.

At the Meeting of the London County Council last Tuesday, Mr. Cobb complained of the large expenditure for gas repairs in the elementary schools of the Metropolis. They had, it appeared, spent £669 8s. 7d. on mantles during the first four months of the present year, which, at 4s. per dozen, would amount to 40,166 mantles. He was not acquainted with the manner in which these mantles were supplied, but he thought there must be an enormous waste in connection with them. In the cash paper, gas repairs appeared in a variety of ways. There was a sum of £1300 in respect of repairs to gas-fittings, £1200 for rearranging gas-fittings, and £600 in payment for mantles; while £147 was charged for globes. This made a sum of more than £3000 in four months which had been spent entirely on gas fittings and mantles in elementary schools. He was not aware of the number of these schools that were fitted with the incandescent instead of the old system of lighting; but, without taking this into consideration, the fact that 40,000 mantles had been put out of action in a short period of four months surely showed that there was great waste of material. Lord Welby, the Chairman of the Finance Committee, said the matter was one he could not explain; but the Chairman of the Education Committee would, he thought, be able to give a satisfactory reply to Mr. Cobb.

The Highways Committee reported on the subject of the lighting on Thames Bridges, the improvement of which they said they had had under consideration. At present, with the exception of a few lights on Westminster Bridge, all the Thames Bridges under the Council's control are lighted by gas, and of these only Lambeth, Putney, and Waterloo Bridges are fitted with incandescent burners. Until recently, it has not been possible to adopt this type of lighting on certain of the bridges, owing to the heavy vibrations. Burners with anti-vibrating apparatus have, however, been successfully used on Lambeth Bridge; and the Committee thought similar burners should be put on the Albert and Chelsea Bridges. They further considered that incandescent burners of the ordinary type should be fitted to the lamps on Battersea Bridge, as the vibration there is not so great. The total cost of the work will not, it is estimated, exceed £110; and this expenditure is provided for in the vote on account of the annual maintenance estimates for 1906-7. They recommended—"That expenditure not exceeding £110 be sanctioned for the installation by the Gaslight and Coke Company of incandescent gas-burners in the lamps on the Albert, Battersea, and Chelsea Bridges;" and this was agreed to.

GAS SUPPLY IN AUCKLAND (N.Z.).

Readers of the "JOURNAL" are aware that Mr. W. A. Valon was absent from England for some months last year on a visit to the Colonies. When in New Zealand, he called at Auckland, where he had the pleasure of meeting Mr. E. B. Parsons, the Secretary of the Gas Company. Mr. Parsons lately sent Mr. Valon the report and accounts of the Company for the year ending the 31st of December last, accompanied by some particulars of the progress of gas supply in the town, and they have been placed by him at our disposal.

Dealing first with the report and accounts, they show that the sale of gas for private consumption produced a revenue of £81,745; public lighting brought in £5164; residual products, £15,591; gas-fittings, &c., £2078; and rents, £94—making a total of £104,672. The expenditure on the manufacture of gas was £45,877 (coals costing £29,717); on distribution, £8462; and on management, £5731—the total outlay, including interest on borrowed money, being £68,122. The balance carried to the net revenue account was consequently £36,550. At the annual meeting—the 44th in the Company's existence—the Directors recommended a dividend of 8s. per share for the second half of the year, which, added to the interim dividend paid in July, would amount to £26,975; leaving a surplus of £9575 on the year's working. The Chairman (Mr. Buddle), in moving the adoption of the report, said there had been a large increase in the quantity of gas sold in the year, representing 18,757,000 cubic feet. The total sales yielded £86,908, which was an increase of £4450 on the return for 1904; while the residuals produced £2437 more. The Directors thought the time had arrived when they could make a substantial reduction in the price of gas; and they had decided on taking off 3d. per 1000 cubic feet to all consumers—bringing the figure down to 4s. 9d., with special discounts to large consumers. These reductions would represent a total value of about £6000. The Chairman concluded by referring to the continued zealous and loyal co-operation of the officers and employees, who, he said, had contributed largely to the success of the undertaking, and to whom the thanks of the shareholders were due. The report was adopted.

In view of the results recorded above, it will be interesting to give the particulars of the progress of the Company to which reference was made above. Seventy years ago, there was not a white man on the isthmus. Mr. Parsons landed in 1863, and gas was first supplied in Auckland in 1865, the price charged being 20s. per 1000 cubic feet. In 1868, the quantity sold was 6 millions; in 1905 it was 342·3 millions. In the last-named year, there was a considerable sale of gas-fittings; and the number of Welsbach burners sold was 5545—bringing up the total sales to 30,845. The quantity of coal carbonized was 30,170 tons, from which 370,437,900 cubic feet of gas were made; being at the rate of 12,278 cubic feet per ton. The number of consumers was 12,667 out of a population of 65,000; and they burnt, on an average, 27,026 cubic feet each. There were in use about 193 miles of mains.

REDUCTION IN THE PRICE OF THORIUM.

On Monday last week, an article on this subject, from a Berlin correspondent, appeared in the Financial and Commercial Supplement to "The Times." The writer first of all showed how the invention of the gas-mantle had led to a demand for thorium, its chief constituent, and how this had been met by the discovery of deposits of monazite in Brazil and North and South Carolina. He then traced the steps which led to the formation of the Thorium Convention in 1902, and pointed out how this resulted in the raising of the price of thorium to 53 marks per kilogramme, less 7 per cent. discount. This led to renewed endeavours being made to open up new sources of supply. A French enterprise began to bring monazite from the interior of Brazil at the rate of 500 to 600 tons a year. The United States also received more attention as a monazite-producing area; and, in addition to some small German firms, the American Welsbach, the National Light and Thorium Company, and the South Metropolitan Gas Company acquired land in Carolina and began to work the sands. The writer then proceeds:

> Mantle makers outside the Convention were forced by the high price of thorium nitrate to resort to buying up the ashes of old mantles and the residues from other mantle factories. A kilogramme of such mantle ash, costing 50 marks, would yield 1·6 to 1·8 kilogrammes of thorium nitrate. The Convention, to cut off this source of supply, offered to exchange 1¼ kilogrammes of thorium for 1 kilogramme of residues; and thus in this case practically lowered the price of the nitrate to 40 marks per kilogramme, while nominally the market price remained 53 marks less 7 per cent. discount. In the early part of this year, the Convention decided upon effectually killing all competition by suddenly dropping the selling price of thorium nitrate to 27 marks per kilogramme, less 3 per cent. discount—this price still leaving a good margin of profit on the cost of production, and by the original agreement stopping the sharing of profits with De Freytas and Gordon, who are compelled to continue to supply monazite till July, 1907. Seldom in the history of chemical industry has any chemical product undergone such marked variations of price within a few years as thorium.
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> Early in 1894, thorium nitrate was sold at 2000 marks per kilogramme, and by January of the next year it had fallen to 900 marks; in July of the same year it stood at 500 marks, and in November at 300 marks. In 1896, it fell in May to 150 marks; and in October, to 90 marks—touching its lowest price (30 marks) in 1899. After that the price was pushed up to 53 marks less 7 per cent. discount in May, 1904—a figure which the Convention succeeded in maintaining till January of this year, when, as above stated, it dropped without the slightest warning to 27 marks, less 3 per cent. discount. This sudden *coup* spread consternation through the manufacturing trade. The result was disastrous to the small thorium works outside the ring, with large stocks of high-priced raw material on hand. Some suspended operations, others went bankrupt, and the Thorium Convention was left completely master of the field.

The writer concludes by pointing out that the whole business throws an interesting sidelight on the methods of German speculation, and forms a striking illustration of the power and danger of the German kartels. He says that the mantle makers will be expected by the public to sell the mantles at a cheaper rate, while most of them are working with stocks purchased a year in advance at prices 50 per cent. higher than those now ruling. The situation is somewhat better for those who have agreements with the Convention, for they will get the benefit of the so-called "bear" clause. The manufacturers recently held a meeting in Berlin to try to combine and fight the policy of the Convention; but they were unable to come to an agreement. In the opinion of the writer, the German manufacturers and business men have committed a great blunder by their speculative tactics, and have only succeeded in drawing the attention of mercantile classes everywhere, and of the Brazilian Government in particular, to an industry which they had practically in their own hands, and in which enormous profits were being made. Formerly Germany ruled the market both for the supply of thorium and cerium nitrates and also of incandescent mantles; but now probably the monazite sand proprietors and concessionaries in Brazil and elsewhere will combine to form an International Thorium Syndicate, which will tend to deprive Germany of its present predominance in the incandescent gas-mantle industry and the subsidiary chemical trade.

CLOSING OF THE GAS EXHIBITION IN ABERDEEN.

The exhibition of gas appliances which was opened in the Music Hall, Aberdeen, on the 18th ult., by Bailie Esslemont (of which some particulars were given in the "JOURNAL" the following Tuesday), was brought to a close last Thursday, instead of on the 28th ult. as originally arranged. The time had been extended on account of the great success of the exhibition, which was visited not only by large crowds daily, but by a number of gas managers from various towns in Scotland. The cookery lectures, with practical demonstrations, by Miss E. M. Dods, the Principal of the Dundee School of Cookery, and Mrs. J. J. Middleton, of the National Training School of Cookery, at South Kensington, were particularly attractive; and much interest was shown in the popular lectures on gas lighting given by Mr. Samuel Milne, the Gas Engineer to the Aberdeen Corporation. Upon Mr. Kemp, the Convener of the Gas and Electricity Committee, fell the heavy task of carrying out the undertaking; and he discharged it with conspicuous success. The whole of the details were admirably organized by the Gas Office staff under the personal supervision of Mr. Milne, who lent untiring and enthusiastic service in promoting the success of the exhibition, which was declared on all hands to be the finest of the kind ever held in Scotland.

At the closing ceremony, at which there was a large gathering, Mr. Kemp said they had come to the end of an interesting and instructive exhibition; and he had learnt with pleasure that the exhibitors were satisfied, which indicated that they had been getting a considerable amount of custom. The previous night, the three principal exhibitors were almost neck-and-neck in their sales; and it was very satisfactory to know that everybody had been getting a very fair share of public patronage. On behalf of the Committee and the Town Council generally, he thought it was only fair to say that they appreciated the response the public had made to the opportunity afforded them; and that both the exhibitors and the Corporation had ample reason to be satisfied with the efforts made and the results which would follow. He called upon the Lord Provost to declare the exhibition closed.

Lord Provost Lyon said he thought, from what had just been stated by Mr. Kemp, that they might all congratulate themselves on the great success of the exhibition, which had been a real technical education to the citizens of Aberdeen. Theory was all very well, when sitting in their arm-chairs reading the advertisements in the papers. But to come and see the articles in the hall was worth twenty advertisements; and he was quite sure the Aberdonians had had an object-lesson in how to use gas, both for lighting and cooking. The results would be all that Mr. Kemp had said, and there would be a large increase in the demand for the apparatus and in the consumption of gas. They were all very much obliged to Mr. Kemp and his Committee for the manner in which they had got up the exhibition. They had done their utmost to make it a success; and the results justified all the energy they had thrown into it. They were also very much indebted to Mr. Milne and his assistants. They had been very much gratified at the heartiness with which he had gone into every department of the exhibition; and largely owing to his efforts, and those of his Assistant (Mr. Smith), it had been a great success. He was pleased to hear that the exhibitors had made a large number of sales, and that about 1000 stoves and other articles had been taken up by the citizens within the past fortnight. This showed good business; and he was sure it was only the beginning of much larger sales which would take place in the future. They were also indebted to the two ladies who had conducted the cookery classes, who showed in a masterly way what could be done with the stoves; and many people must have been amazed at the good results achieved by these appliances. He also thanked the public for backing up the efforts of the Corporation in showing what could be done with gas; and he was sure the Town Council had been amply rewarded for the time and trouble bestowed upon the exhibition, by the splendid results accomplished.

Mr. A. P. Main, of Messrs. R. & A. Main, Limited, replied on behalf of the exhibitors. He said that, however desirous makers of gas appliances might be to make the exhibition a success, it was impossible to do so without the hearty co-operation of the local Committee; and the exhibitors felt that in Aberdeen they had received from the Convener of the Gas Committee, and also from Mr. Milne and his assistants, very valuable help. These gentlemen had taken up the exhibition with enthusiasm, and the result had been that the exhibitors had done excellent business. He concluded by expressing his thanks for the enthusiastic manner in which the exhibition had been carried out.

Mr. Milne said he wished to acknowledge publicly with gratitude the kind remarks of their worthy Lord Provost, and also of Mr. Main with regard to himself, to his Assistant, Mr. Smith, and to the office staff. He also acknowledged the services of the officials of the outdoor department, who had, he said, done the utmost in their power to make the exhibition the success it had been. He further acknowledged his personal gratitude to the exhibitors who had come forward with such willingness to show what could be done in lighting, cooking, and heating by means of gas. The purpose of the exhibition was that it should be an education to the people of Aberdeen; and he was very pleased they had availed themselves of the opportunity afforded them.

A hearty vote of thanks was accorded to the Lord Provost; and the proceedings concluded with the singing of "Auld Lang Syne."

SHREWSBURY WATER BILL.

The Ratepayers Reject the Upland Scheme.

The authorities at Shrewsbury have taken the poll of the citizens which was demanded after the public meeting held last month, at which the Bill for carrying out the Pulverbatch Water Scheme was agreed to (*ante*, p. 252); but the result has only been to further complicate the matter. Against the scheme, 1918 votes were recorded; while those in favour numbered 1365—majority against, 553. Thus about 3200 of the duly qualified citizens voted; while nearly 2000 were apparently insufficiently interested in the question to go to the poll. It is hardly surprising that one of the members of the Council should describe this apathy as "perfectly monstrous;" and it is impossible not to agree with him that this kind of thing does not furnish encouragement to men to give up their time to public work. The preliminary stages in the promotion of the Bill have, of course, been gone through; and considerable outlay must have already been incurred. The scheme which had been fixed upon—as the result of another poll of the ratepayers, be it noted—consisted of a gravitation supply; and it was estimated that the annual charge on the outlay would mean 2d., or at most 3d., extra on the rates, in return for which the borough would

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 360.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	21—22	..	4 15 5
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	Nov. 15	7	Bombay, Ltd.	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	4¾—5¼	..	5 6 8
50,000	10	Mch. 9	14	Bourne- 10 p.c.	28½—29½	..	4 14 11
51,810	10	,,	7	mouth Gas B 7 p.c.	16½—17½	..	4 0 0
53,200	10	,,	6	and Water Pref. 6 p.c.	15—16	..	3 15 0
380,000	Stk.	Feb. 22	12½	Brentford Consolidated	263—268	..	4 13 3
300,000	,,	,,	9⅜	Do. New	197—202	..	4 14 1
50,000	,,	,,	5	Do. 5 p.c. Pref.	123—128	..	3 10 11
206,250	,,	Dec. 14	4	Do. 4 p.c. Deb.	105—108	..	3 14 1
220,000	Stk.	Mch. 9	11¼	Brighton & Hove Orig.	230—235	..	4 15 9
246,320	,,	,,	8¼	Do. A. Ord. Stk.	163—168	..	4 18 3
460,000	20	Apl. 11	10	British	42—43	..	4 13 0
100,000	Stk.	Feb. 22	6	Bromley, Ord. 5 p.c.	121—124	..	4 16 9
165,700	,,	,,	4½	Do. do. 3½ p.c.	92—95	..	4 14 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	12½—13	..	5 7 8
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
150,000	20	Mch. 9	8¼	Cagliari, Ltd.	23—25	..	6 12 0
100,000	10	Sept. 28	10	Cape Town & Dis., Ltd.	16⅝—17¼	..	5 15 11
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	9¾—10¾*	..	4 7 10
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54*	+1	5 11 1
50,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,443,280	Stk.	Feb. 22	5⅛	Commercial 4 p.c Stk.	113—115	−1	4 10 5
560,000	,,	,,	5	Do. 3½ p.c. do.	110—112	−1	4 9 3
475,000	,,	Dec. 14	3	Do. 3 p.c. Deb. Stk.	85—87	..	3 9 0
800,000	Stk.	,,	6½	Continental Union, Ltd.	129—132	..	4 18 6
200,000	,,	,,	7	Do. 7 p c Pref.	143—148	..	4 14 7
432,070	Stk.	Feb.	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk.	105—107	..	3 14 9
486,090	10	Jan. 25	11	European, Ltd.	23½—24½	+½	4 9 9
354,060	10	,,	11	Do. £7 10s. paid	17½—18½	+½	4 9 2
15,223,235	Stk.	Feb. 8	4⅛	Gas- 4 p.c. Ord.	96—98	+1	4 9 9
2,600,000	,,	,,	3½	light 3½ p.c. max.	87—89	..	3 18 8
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	107—110	..	3 12 9
4,193,975	,,	Dec. 14	3	Coke 3 p.c. Con. Deb.	86—88	−1	3 8 2
258,740	Stk.	Mch. 9	5	Hastings & St. L. 3½ p.c.	98—102	..	4 18 0
82,500	,,	,,	6½	Do. do. 5 p.c.	121—124	..	5 4 10
70,000	10	Apl. 11	11	Hongkong & China, Ltd.	19½—20⅝	..	5 7 4
3,800,000	Stk.	Nov. 15	10	Imperial Continental	234—236	−1	4 4 9
473,600	Stk.	Feb. 8	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 5
175,242	Stk.	Mch. 28	6	Lea Bridge Ord. 5 p.c.	121—126	..	4 15 3
561,000	Stk.	Feb. 22	10	Liverpool United A	235—237	..	4 4 5
718,100	Stk.	Feb. 22	7	Liverpool United B	169—171	..	4 1 10
306,083	,,	Dec. 29	4	L'rpool Unit'd Deb. Stk.	109—111	..	3 12 1
75,000	5	Dec. 14	5	Malta & Medn., Ltd.	4¼—4⅜	..	5 5 3
560,000	100	Apl. 2	5	Met. of 5 p.c. Deb.	102—104	+1	4 16 2
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 15	3½	Monte Video, Ltd.	11½—12½	..	5 12 0
1,675,892	Stk.	Feb. 22	4⅝	Newc'tle & G'tesh'd Con.	108—110	..	4 4 1
406,025	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
15,000	10	Mch. 9	10	North Middlesex 10 p.c.	19—20	..	5 0 0
52,940	10	,,	7	Do. 7 p.c.	12⅝—13½	..	5 3 8
300,000	Stk.	Nov. 30	8	Oriental, Ltd.	150—153	..	5 4 7
600,000	5	Mch. 28	7	Ottoman, Ltd.	6—6¼	..	5 7 8
398,490	5	Apl. 26	7	Primitiva Ord.	6¾—7*	..	5 0 0
796,980	5	Jan. 25	5	Do. 5 p.c. Pref.	5¼—5½	..	4 10 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
851,070	10	Apl. 26	7	River Plate Ord.	12⅝—13¼*	..	5 5 8
300,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
250,000	10	Mch. 28	8	San Paulo, Ltd.	14—14½	..	5 8 6
70,000	50	Jan. 2	5	Do. 5 p.c. Deb.	50—52	..	4 16 2
135,000	Stk.	Mch. 28	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	243—245	..	4 1 8
523,498	,,	,,	10	Do. C	243—245	..	4 1 8
126,106	Stk.	Mch. 9	5⅜	Shrewsbury Ord. 5 p.c.	109—119	+1	4 12 5
70,000	10	Sept. 28	10	South African	16½—17½	..	5 14 3
6,250,000	Stk.	Feb. 22	5⅜	South Met., 4 p.c. Ord.	125—127	..	4 6 8
1,895,445	,,	Jan. 11	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
575,000	Stk.	Mch. 9	5⅜	S'th Suburb'n Ord. 5 p.c.	120—123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
112,533	,,	Jan. 11	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	Nov. 15	5	Southampton Ord.	109—112	..	4 9 3
120,000	Stk.	Mch. 9	6¼	Tottenham A 5 p.c.	124—127	..	4 18 5
363,020	,,	,,	4¾	and B 3½ p.c.	99—102	..	4 13 2
137,500	,,	Dec. 14	4	Edmonton 4 p.c. Deb.	105—107	..	3 14 9
182,380	10	Dec. 29	8	Tuscan, Ltd.	10¼—10⅝	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
30,000	Stk.	Feb. 22	7⅜	Wands- A 5 p.c.	—	..	—
255,636	,,	,,	6¼	worth B 3½ p.c.	133—136	..	4 11 11
75,000	,,	,,	5⅛	and C 3½ p.c.	110—113	..	4 16 0
69,416	,,	Dec. 29	3	Putney 3 p.c. Deb. Stk.	82—85	..	3 10 7
745,872	,,	Mch. 9	5⅜	West Ham 5 p.c. Ord.	107—109	..	4 14 0
185,000	,,	,,	5	Do. 5 p.c. Pref.	122—125	..	4 0 0
193,300	,,	Dec. 29	4	Do. 4 p.c. Deb. Stk.	106—109	..	3 13 5

Prices marked * are "Ex. div."

have secured an abundant quantity of pure water, which would have been laid on in the houses all over the town and suburbs. The opponents contend that in reality no fresh supply is required; on the other hand, the Water Committee have long realized that a new and large scheme will have to be provided if the town is to be properly served and adequately secured against risk of a water famine.

Speaking at a special meeting of the Town Council after the poll, Alderman S. Meeson Morris, the Chairman of the Water Committee, said the position seemed to be this: The town, with no uncertain voice, had decided against a river scheme; and with a voice that was perhaps not quite so certain, but which was at any rate emphatic, they had decided against an upland scheme. The conclusion that he had therefore come to was that they wanted nothing. For himself, he thought that even if Moses were to come down and strike the rock there would be some who would say that the water was not pure enough, some would say that it was too dear, while some, he was sure, would be quite certain to say that they preferred to drink from the River Severn. Recognizing, as he did, that a very large majority of the people—at any rate, of those who had voted—were satisfied with things as they were, the responsibility for what might occur in the future must rest entirely with them. It did not rest with the Council—at least, not with the large majority, because he imagined that the small minority of the members who thought that nothing should be done were content to take the responsibility on their shoulders. He could not accept this responsibility. He had striven to the best of his ability to bring about some improvement in the water supply. He did not want to make any rash statement or to speak hurriedly; but it might be that he and other members of the Water Committee who believed with him that something should be done to improve the water supply, might think it well to hand over their duties to other gentlemen who thought nothing should be done. The situation had not yet been fully considered; but it was one that he felt bound to consider and confer upon with his colleagues before making any statement.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

At the monthly meeting of the Edinburgh and Leith Gas Commissioners on Monday, in a report upon the stoves account and the suspense account, the Finance and Law Committee recommended that in the stoves account there should be entered, as from last Whitsunday, the value of the stoves, &c., on hand or lent on hire at that date—£13,154—being the balance shown on last year's accounts; that to this sum there would be added the purchases, and deducted the sales, during the year to Whitsunday next; and that from the result there should be deducted 7½ per cent. for depreciation, charged to revenue account, the balance being taken to be the value of the stoves, &c., on hand or lent on hire as at Whitsunday next. As to the suspense account, the Committee recommended that the amount of it as at Whitsunday last—£4580, being the amount expended on Granton properties several years ago—should be debited to capital in the current year's accounts. After much discussion, the minute was approved.

Then Mr. Bryson, the Convener of the Works Committee, said they had had before them a great many tenders for stores, and they had agreed to accept a number of them. They had accepted offers for 170,000 tons of coal—35,000 tons of cannel, and 135,000 tons of common coal. The average price was 12s. 3·5d., as against 12s. 1·8d. last year. The Chairman moved approval of this minute. He thought they had done very well indeed in buying at only 2d. per ton more than last year. The motion was agreed to. The contract for meters up to thirty lights was let to Messrs. James Milne and Son, Limited, of Edinburgh. The prepayment meter tenders were sent back, to go into the question further. The tender of Messrs. D. Richmond and Co., Limited, of Glasgow, for tubes and fittings, was, after some discussion, accepted by seven votes to four. The Commissioners agreed to a large number of other tenders for general stores.

Regarding coal contracts, the "Glasgow Herald" of Wednesday, in its commercial columns, contained the following: "The Edinburgh Corporation Gas Commissioners have just accepted offers for their yearly requirements of coal for gas-making purposes. In all, they have brought from 170,000 to 175,000 tons. The overhead average price agreed to is about ½d. per ton less than that for the previous year's contracts; but this is due to the fact that only some 35,000 tons of first-class cannel coal have been taken, as against about 70,000 tons last year. From 135,000 to 140,000 tons of splint and other gas coals have been contracted for, principally from the Lothians, at from 3d. to 6d. per ton above previous prices, and in a few cases at an advance of 9d. per ton. . . . Within the last ten days or so Paisley, Dundee, Perth, and a number of other corporations have also purchased their yearly requirements. With regard to Paisley, it may be stated that hitherto the custom was to buy best Lancashire splints; but this year a departure has been made from this practice, and Ayrshire and some different kinds of Lanarkshire coals to what had previously been used, have been purchased. Dundee and Perth have bought considerable quantities of Lanarkshire nuts, and only a small portion from Fifeshire. As regards prices for Lanarkshire coal, these show a somewhat similar advance to that conceded by Edinburgh. The Glasgow Corporation is expected to purchase at about the end of this month."

This week there has been still another move in the endeavour to "expose" certain doings of the Edinburgh and Leith Gas Commissioners. This time it is in connection with an inquiry as to conditions of employment and emoluments of the Engineer, the Treasurer, the Collector, and the Clerk to the Commission. Fourteen questions were drawn up by Bailie Pennell, of Leith, a new member of the Commission; and the officials have framed answers to them. An early copy of the document has been obtained, and a summary of it, of very doubtfully balanced proportions, has been published. It is so far from complete that it seems to me to be unfair to the parties interested to do

CARBURETTED WATER-GAS APPARATUS

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The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
Blackburn	1,250,000	Buffalo, N.Y.	2,000,000	Newcastle-on-Tyne	1,800,000
Windsor St. Works, Birmingham	2,000,000	Winnipeg, Man.	500,000	Leeds	1,800,000
Saltley Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Malton	150,000
Colchester	300,000	York	750,000	Smethwick	500,000
Birkenhead	2,250,000	Rochester	500,000	Gravesend	300,000
Swindon (New Swindon Gas Co.)	120,000	Kingston, Ont.	300,000	Pernambuco, Brazil	125,000
Saltley, Birmingham (Second Contract)	2,000,000	Crystal Palace District	2,000,000	Duluth, (Second Contract)	300,000
Windsor St., Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Leicester (Second Contract)	1,000,000
Halifax	1,000,000	Caterham	150,000	Newport (Second Conttract)	250,000
Toronto	250,000	Leicester	2,000,000	Brockville	250,000
Ottawa	250,000	Enschede, Holland	150,000	Toronto (Third Contract)	750,000
Lindsay (Remodelled)	125,000	Buenos Ayres (River Plate Co.)	700,000	Montreal, Ont. (Second Con.)	1,800,000
Montreal	500,000	Burnley	1,500,000	Toronto (Fourth Contract)	1,000,000
Toronto (2nd Cont., Remodelled)	2,000,000	Kingston-on-Thames	1,750,000	Hamilton, Ont.	400,000
Belleville	250,000	Accrington	500,000	Rochester (Third Contract)	1,600,000
Ottawa (Second Contract)	250,000	Tonbridge	300,000	Leeds (Second Contract)	900,000
Brantford (Remodelled)	200,000	Stretford	500,000	Buenos Ayres (Primitiva Co.)	1,200,000
St. Catherines (Remodelled)	250,000	Oldbury	300,000	Buenos Ayres (New Co.)	1,200,000
Kingston, Pa.	125,000	Todmorden	500,000	Christchurch, N.Z.	300,000
Peterborough, Ont.	250,000	Saltley, Birmingham (Third Contract)	2,000,000	Rochdale	1,600,000
Wilkesbarre, Pa.	750,000	York (Second Contract)	750,000	St. John's, Newfoundland	250,000
St. Catherines (Second Cont.)	250,000	Rochester (Second Contract)	500,000	Brantford (Second Contract)	400,000
		Newport (Mon.)	250,000	Smethwick (Second Contract)	500,000
		Tokio, Japan	1,000,000	Pontypridd	250,000
				Montreal (Third Contract)	1,800,000

And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

more than refer to the matter; leaving the subject over for consideration till particulars can be obtained in an authoritative manner.

The exhibition of gas appliances in Aberdeen proved to be so great a success that, instead of closing it on the evening of Saturday last, it was kept open till Thursday evening of this week. On account of previous engagements, Miss E. M. Dods, of Dundee, was unable to continue as lecturer; and Mrs. Middleton was appointed in her stead. During the run of the exhibition, the Gas Managers from Inverness, Elgin, Nairn, Forres, Peterhead, Fraserburgh, Huntley, Inverurie, Banchory, Stonehaven, Dundee, Forfar, and Montrose—some of them being accompanied by their Directors—visited it; and all of them expressed the highest admiration of the apparatus and appliances. On Monday last, the Lighting and the Fires Committee of Aberdeen Town Council paid an official visit to the exhibition. In their tour of the hall they were specially interested in the incandescent street lamps and lanterns of Messrs. Alder and Mackay, of Edinburgh—the lanterns being storm-proof in winds up to eighty miles an hour—and in the intensified gas-lighting exhibits of the James Keith and Blackman Company, Limited. On the evening of Saturday last, Mr. S. Milne, the Gas Engineer, delivered his second lecture in connection with the exhibition; his subject this time being "Coal Gas as a Fuel." Mr. Kemp, his Convener, presided. Mr. Milne said the purpose of his paper was to make more generally known the various uses to which coal gas might advantageously be applied as a fuel; to indicate the chief points to be observed in the working of gas appliances; and to try, if possible, to dispel the prejudices which, even in the Twentieth Century, existed in the minds of some in regard to the use of gas for cooking and heating. Mr. Milne gave an instructive lecture, covering a wide field, and bringing out the economy and efficiency of gas cookers and heaters. The exhibition was closed on Thursday evening by a formal ceremony. [An account of this will be found on p. 394.]

The question of the allowance to be made to Mr. A. W. Stiven, the City Chamberlain of Dundee, on his taking over the duties of Treasurer of the Gas Department, was the subject of a lively discussion in the Town Council on Thursday. The Council eventually, by 14 votes to 8, fixed the allowance at £100.

In my "Notes" in the "JOURNAL" for the 3rd ult., I referred to the proposed construction of a railway siding into the gas-works of the Hamilton Corporation, and mentioned that a plebiscite of the ratepayers was to be taken on the subject. This was done, and the result was announced last Tuesday evening. Of the 6109 cards posted, only 2360 were returned, and when they were tabulated they showed a majority of 50 against the proposal. The numbers were: Against, 1204; in favour, 1154 (together 2358); declined to answer, 2.

CURRENT SALES OF GAS PRODUCTS.

Week ending May 5.

In the London markets for tar products, prices have remained steady. The labour troubles in the North of France appear to have been overcome, and the collieries there continue to take their contracted supplies of pitch for briquette making. Considerable demand for 60° crude carbolic acid has caused an advance in the quotation, and 1s. 10d. net has been paid for delivery to September. Benzol 90 per cent. for prompt is still 9½d to 9¾d net. Sulphate of ammonia receives but little attention. Transactions are scarce, and as yet there is no hardening in the price. On the other hand, stocks are reported low at the various ports, and there is no pressure to sell. Quotations remain nominally unaltered.

LIVERPOOL, *May* 5.

Sulphate of Ammonia.

There has been fair demand for immediate delivery, but on the whole the tone of the market is quiet, and at the close prices are rather higher, the quotations being £12 3s. 9d. per ton f.o.b. Hull, and £12 5s. per ton f.o.b. Liverpool and Leith. Offers from abroad have mostly been distinctly below current quotations, and consequently direct business has been limited. Home demand, too, seems to be falling off. In the forward position important business is reported to have been taken speculatively at a substantial discount on spot prices, but so far makers do not seem disposed to follow this lead.

Nitrate of Soda.

This article is, owing to arrivals, a little easier. The spot prices are 11s. 7½d. per cwt. for 95 per cent., and 11s. 10½d. per cwt. for refined.

LONDON, *May* 5.

Tar Products.

There has been nothing fresh to report during the past week, though there appears to be an improved inquiry for pitch. There is no actual change in the market; but prices are rather firmer for forward delivery. Until the ultimate result of the strike in the North of France is ascertained, it will be difficult to fix exact values. In London, the largest makers still ask 32s.; but as dealers are prepared to sell at 27s. 6d. to 28s., business is impossible. Yorkshire makers are reported to have accepted 26s. 6d. for prompt, and 27s. 6d. September-December; while one of the largest makers reports having declined 28s. 6d. for the whole of next season, but this is a particularly fine make which always commands a premium. In Liverpool, no sales of importance are reported; but manufacturers are said to have declined 26s. for the whole of next season, though this would appear to be rather over market value. In carbolic acid, there is still a good demand for 60's, while 1s. 6½d. has been declined for 50's on the east coast. Business in 60's is reported for May-July at 1s. 9¾d., and there appears to be an improved demand from English consumers; but, as a rule, makers are not disposed to sell, believing apparently that the definite placing of the Russian and French contracts for crystals may cause an improvement at an early date. The market for crystals is at present in rather an unsettled state, owing to the uncertainty regarding foreign tenders. Benzol is quiet; but there is rather more inquiry. In 90 per cent.,

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there are certainly buyers at 9½d., and it is probable that 9¾d. could be realized up to the end of the year in London; but there are sellers in the North at rather less than this. In 50-90 per cent., it is reported that 10d. has again been declined for July-December by Yorkshire manufacturers, who would accept 10½d., which price, however, consumers decline to pay. In toluol, there is practically nothing offering. There are buyers at 1s. 0½d. to 1s. 1d. according to position; but manufacturers will not consider these prices for forward, and what little there is to spare for May-June delivery could no doubt be placed at 1s. 1d. Creosote is firmer. London makers report sales at 1⅜d., at which price it is believed about 150,000 gallons were recently placed for forward delivery. There are no quantities offering in Yorkshire, and, as a rule, makers ask 1¾d., while one of the largest manufacturers is reported to have declined 1½d. In Lancashire, 1½d. is about the nominal price; but there is no business of importance. The demand from America does not appear quite so good as was the case a little time back. In solvent, there have been one or two inquiries for prompt delivery of best London make during the last few days; and for this manufacturers ask very high prices. But in the North, makers have accepted 11d. to 11½d. for July-December; and it is believed there are still sellers at these figures. No transactions are reported to have taken place in anthracene, and it is not probable that there will be much business doing until consumers have somewhat reduced their stocks.

The average values during the week were: Tar, 16s. to 21s. Pitch, London, 27s. 6d. to 28s.; east coast, 26s. 6d. to 27s.; west coast, 25s. Benzol, 90 per cent., 9¾d.; 50-90 per cent., 10d. to 10½d. Toluol, 1s. 0½d. to 1s. 1d. Crude naphtha, 4d. to 4¼d.; solvent naphtha, 1s. 0½d. to 1s. 1d.; heavy naphtha, 11d. to 11½d. Creosote, London, 1⅜d. to 1⅝d.; North, 1½d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9½d. to 1s. 10d. Refined naphthalene, £4 10s. to £8 10s.; salts, 19s. to 20s. Anthracene, "A" quality, 1¼d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been quiet throughout the week, but prices have remained fairly steady. London makers still quote £12 10s.; but seeing that business could be done upon Beckton terms at £12 3s. 9d. to £12 5s., this price is purely nominal. In Hull, no business is reported, and the price remains at about £12 3s. 9d. In Leith, makers are reported to have cleared out small quantities at the end of April at £12 5s.; and this is about the ruling price. A few small lots have changed hands in Liverpool at £12 3s. 9d. to £12 5s., according to quality; but no business of importance has taken place.

COAL TRADE REPORTS.

Lancashire Coal Trade.

A steady trade is being done in coal of all descriptions. The demand for engine fuel is constant. House coal shows a little falling off; but shipping coal is in good request. Gas coal and cannel are a little easier. Although the terms have not been revealed, the Salford Corporation last Wednesday sanctioned contracts for various kinds of coal and cannel required by the Gas Committee to the extent of about 90,000 tons, to be delivered during the next twelve months. The contracts are shared by a dozen different coal and colliery companies. Prices on the Coal Exchange are unchanged from those published in this column last week.

Northern Coal Trade.

The coal trade shows some signs that settlement of the question of the coal-tax is giving more stability to the prices that are quoted, though there is still the irregular inquiry from France which has of late influenced the values. The commencement of the shipments of coal to the Baltic ports is one of the normal influences at this season. It has begun, and will add to the exports for some time. Naturally, prices are firm; best Northumbrian steams being quoted from 11s. 3d. to 11s. 9d. per ton f.o.b., second-class steams being about 10s. 9d., while steam smalls are very firm and scarce, with higher quotations—from 7s. to 7s. 9d. The Durham collieries are well employed; but the home deliveries are now considerably lower, though there are increasing exports of gas coal. Prices for occasional cargoes vary from about 9s. 3d. to 10s. 3d. per ton f.o.b., according to quality—the best descriptions of Durham gas coal being relatively the firmest. Tenders are now being sought for the gas coals for one of the Norwegian cities, and a few days are likely to decide it. It is thought that one effect of the coal-tax repeal may be to cause users to lessen stocks abroad until after the duty is abolished. Nothing more seems to have been done as to the London contracts. There is no change of moment in coke; and gas coke is now in rather lessened stock. Prices are quoted at about 10s. 6d. to 10s. 9d. per ton f.o.b. for good gas coke.

Scotch Coal Trade.

The volume of trade is very large. There is a fear, however, that the abolition of the coal-tax being postponed till November, there will be a holding back of orders as far as possible between now and then, which may lessen the demand. One effect of the postponement will be that before the tax is removed, the Baltic trade will have ceased for the season, and traders thither will, of course, derive no benefit from the remission this year. For current trade, prices keep steady; and the fact that the Edinburgh and Leith Gas Commissioners have been able to secure their year's supply at an average advance of only 2d. per ton is an indication that forward rates are not, so far as can be seen, to be much higher this year. The prices quoted are: Main 8s. to 8s. 3d., ell 9s. to 10s. 3d., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 321,838 tons—an increase of 29,374 tons upon the previous week, and of 86,095 tons upon the same week of last year. For the year to date, the total shipments have been 4,182,484 tons—an increase of 516,048 tons upon the corresponding period of 1905.

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THE . . .
"COUNTY"
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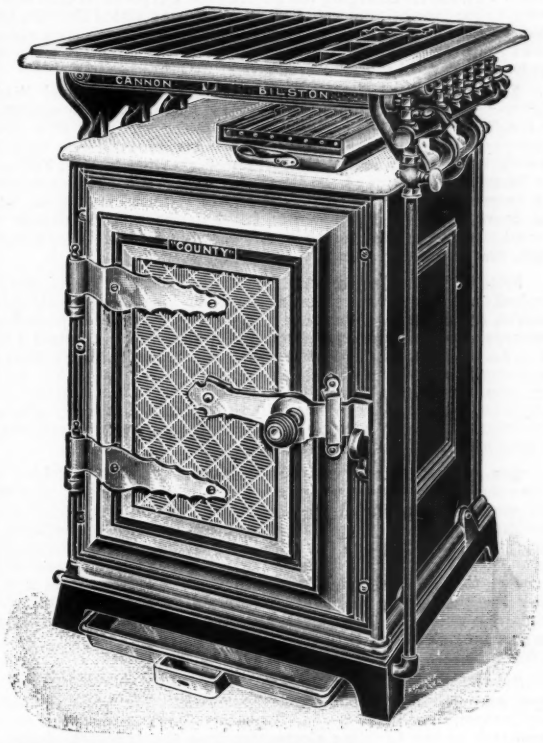

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DEEPFIELDS, Nr. BILSTON, STAFFS.
London Office and Show-Rooms:
Bath House, 57-60, Holborn Viaduct, E.C.

Increased Gas Storage for Manchester.—Reference has already been made to a proposal of the Gas Committee of the Manchester Corporation to erect an additional holder at the Bradford Road station. The work has now been sanctioned. The tank will be 285 feet in diameter, and the holder have a capacity of 10 million cubic feet.

The "Block Light" for Chelsea.—The Works Committee of the Chelsea Borough Council reported last Tuesday, that on the 28th of February last the Block Light Company were allowed to fix on trial for a month their patent lights in the lamps throughout Manresa Road. The Borough Surveyor considered that the lights had given entire satisfaction. It had accordingly been decided to recommend the Council to take over and maintain them.

Sale of Stock.—Recently, Messrs. Charles Butters and Sons sold by auction £2010 of consolidated (old) stock in the Staffordshire Potteries Water-Works Company—ex-dividend accrued due in March and payable in June. The amount realized was at the rate of £248 10s. per £100 of stock, which, excluding the dividend, makes the value on the date of sale £253. This is stated to be a record price for the stock. A 4 per cent. debenture of £60 fetched £67.

Proposed Extensions at the Stockport Gas-Works.—On Friday, Mr. W. O. E. Meade-King, one of the Inspectors of the Local Government Board, held an inquiry at Stockport with respect to a proposed loan of £25,000 for enlarging the plant at the Corporation Gas-Works, owing to the increasing demand for gas. It was stated that the gross revenue for the year ending March, 1905, was £99,630, and the net profit £11,020, of which £9000 was applied in relief of the rates, and the balance carried to the reserve fund.

The Fencing of Gas-Engine Flywheels.—The Midland British Company, who are engineers and ironfounders carrying on operations at Cradley Heath, were last week summoned at the Old Hill Police Court, under the Factory and Workshops Act, for failing to have the flywheel of a gas-engine at their works properly fenced. Mr. Fellowes, the Managing-Director of the Company, said that on the occasion of the Inspector's visit the fencing had been removed for a time, while the limewashing of the room was being done; and the engine was started again before the guard was replaced. A fine of £3, including costs, was imposed.

Price of Gas at Brighouse.—Seeing that a profit of over £3000 has resulted on the operations of the Brighouse Gas-Works for the past twelve months, the Council of the local Chamber of Commerce regard the opportunity as favourable for renewing the request put forward a year ago for a reduction in price and also a graduated scale of discounts for large consumers. The present price of gas in the borough is 2s. 9d. per 1000 cubic feet; and it is pointed out that manufacturers in neighbouring towns already have the benefit of much lower charges. The request has been referred to the Gas Committee for consideration at their next meeting.

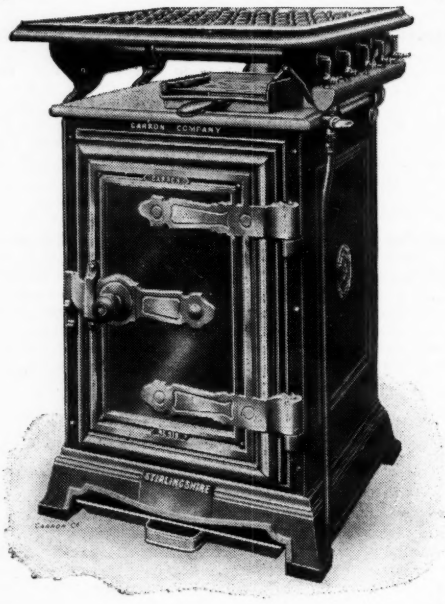
Gas Affairs at Longton.—The Longton Gas and Electricity Committee reported to last week's meeting of the Town Council that they had resolved that a sum of £500, in addition to the £2000 voted at the previous meeting—making a total contribution of £2500—should be paid over to the borough fund in relief of the rates for the ensuing year. The Committee further reported that they had empowered the Manager (Mr. W. Langford) to fit up a small experimental kiln, in order to demonstrate to manufacturers what can be done in colour firing with coal gas; and they had decided that the charges for gas used for heating purposes in manufacturers' kilns or ovens should be at the same rate as for gas for motive-power purposes.

Grantham Satisfied with Gas.—Testimony to the satisfactory manner in which the public lighting is carried out by the Grantham Gas Company was given by the Mayor (Mr. T. Norton) when a recommendation of the Lighting Committee that the contract should be renewed for a further term of three years was under consideration. One of the councillors asked whether the recommendation meant that, although they had two Lighting Companies, the other one had not been asked for a price; and the Mayor replied that they had gone very carefully into the question, and considered the town was very satisfactorily lighted at the present time. Their deliberate opinion, he added, was that it could not be improved upon, or done any cheaper than it was.

Gas Stokers' Wages at Silsden.—There was some discussion at the monthly meeting of the Silsden Urban District Council with reference to the application of two gas stokers for a rise of wages. The matter had been dealt with at a previous committee meeting; but it was again brought forward. The application was for an increase of 3s. per week; and at the meeting referred to it had been decided to give 1s. per week advance. Mr. Basnett said that if the men were advanced by 1s. 6d., their wages would be 33s. 6d. per week in winter and 28s. 6d. in summer. The stokers worked 84 hours a week, or a week-and-a-half of ordinary hours; and he thought they were entitled to an advance of 3s. He was, however, willing that the advance should be 1s. 6d. Mr. Fletcher said the Council had taken other local authorities as a guide in paying their men; and they found they were better paid than many others. Eventually an advance of 1s. 6d. per week was sanctioned.

Tramway Standards for Lighting Purposes. — The General Manager of the Oldham Corporation Gas Department (Mr. A. Andrew) has presented to the Gas Committee a report on a suggestion relative to extending the practice of fixing brackets on tramway standards, in order to dispense with lamp-pillars in the principal thoroughfares. He states that in all cases where a lamp-pillar was within 3 feet of a standard the latter had been used for lighting purposes; but he does not advise that lamp-brackets should be substituted for pillars where the present distance between the standard and the pillar is several yards, as this would interfere with the effective lighting of the roads, and would not look so well, owing to the distance between the lamps being somewhat irregular. From experience it has been found that, owing to the greater damage caused to mantles through vibration, a bracket-lamp requires two-and-a-half times more mantles in twelve months than a pillar lamp; and the same efficiency is not obtained from the former as from the latter.

CARRON COOKERS



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Full Particulars on application to

Carron Company
INCORPORATED BY ROYAL CHARTER 1773

Works: **CARRON, Stirlingshire.**

A member of the Stockport Town Council asked the Gas Committee whether they could not let stoves out free of charge. Other towns, he remarked, did so, and he did not see why Stockport should not adopt a like course. The reply was that the Committee did not intend to let stoves out free.

Mr. A. T. Walmisley, of Westminster, who read a paper on "The Effects of Wind-Pressure on Gasholders," in 1891, before the Gas Institute, and another on "Retort-House Roofs" in 1900, has been appointed by the Corporation of London to make an examination of the roofs of the Central Markets, Smithfield, and their substructures.

The Ayr and Newton Consumers' Gas Company have placed an order with Messrs. Clapham Bros., Limited, of Keighley, for four purifiers, each 20 feet square and 5 ft. 6 in. deep, with Clapham's patent "Eclipse" rubber joint and rapid automatic fasteners; also for the lifting apparatus, valves, and connections, together with the necessary structural work.

The Belfast City Council have agreed to a recommendation of the Gas Committee that, as soon as the necessary alterations to the meters can be effected, the charge for gas to prepayment consumers shall be reduced from 2s. 9d. per 1000 cubic feet to 2s. 3d. This change means that they will receive 37 cubic feet for 1d., as against the present rate of 30 feet.

At the meeting of the Gas Committee of the Oldham Corporation last Wednesday, the General Manager (Mr. A. Andrew) reported that the quantity of gas sold during the past financial year had been 1,318,994,000 cubic feet—an increase of 69,420,000 cubic feet over the preceding twelve months.

The Handsworth Woodhouse Gas Company, near Sheffield, have placed the development of their gas cooker business with the Richmond Gas Stove and Meter Company, Limited. An exhibition will shortly be held, and the whole of the district thoroughly canvassed. The Richmond Company are also to undertake the supply and fixing of the automatic installations.

The Finance Committee of the Westminster City Council reported last Tuesday that on the 25th of February the Council agreed to enter into a contract with the Gaslight and Coke Company for substituting incandescent gas-burners in the public lamps then fitted with flat-flame burners. The contract provided for the cost of the change being payable by the Council by twenty equal quarterly instalments. The work had been completed at an outlay of £2648 2s. 3d., and three quarterly instalments had been paid—leaving £2250 18s. outstanding. The Company had, however, agreed to accept £2100 in full settlement, if paid forthwith. It was decided to take advantage of the allowance of £150 18s., and discharge the liability.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.
ASSISTANT MANAGER. South Shields Gas Company.
DRAUGHTSMAN. C. & W. Walker, Donnington.
FITTER. Cleethorpes Gas Company.
JUNIOR CLERK. Cleethorpes Gas Company.
MECHANICAL ENGINEERS (one for Supervision of Machinery, other Yard Foreman). No. 4595.
STUDENT ACCUSTOMED TO PHOTOMETRY. Deacon's.

Situations Wanted.
FITTER. Carter, Herne Bay. Position on Gas Works. No. 4597.
POSITION IN GAS-WORKS. No. 4597.

Agency Wanted.
INCANDESCENT MANTLES. No. 4598.

Plant (Second-Hand) for Sale.
BARGES. No. 4591.
GASHOLDER. S. Cutler and Sons, Millwall.

Plant (New or Second Hand) Wanted.
AMMONIA STILL CHAMBERS. No. 4596.

Tar Distilling Works and Plant for Sale.
EDWARD RUSHTON, SON, AND KENYON, Manchester.

Company Meetings.
BROMLEY GAS CONSUMERS' COMPANY. Bromley, May 22. Six o'clock.

Stocks and Shares.
CHIPPENHAM GAS COMPANY. May 18.
SHANKLIN GAS COMPANY. May 14.
SOUTHEND WATER COMPANY. May 26.
SUTTON GAS COMPANY. May 22.
WANDSWORTH AND PUTNEY GAS COMPANY. May 29.

TENDERS FOR

Benzol.
HEYWOOD GAS DEPARTMENT. May 15.
LEIGH GAS DEPARTMENT. Tenders by May 12.
WALSALL GAS DEPARTMENT. Tenders by May 26.

Benzolized Creosote.
WALSALL GAS DEPARTMENT. Tenders by May 26.

Boilers.
COVENTRY GAS DEPARTMENT. Tenders by May 14.

Bricks, &c.
LEEDS GAS DEPARTMENT. Tenders by May 19.

Coal and Cannel.
BAKEWELL GAS DEPARTMENT. Tenders by May 21.
BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by May 16.
BIRKENHEAD GAS DEPARTMENT. Tenders by May 17.
BURTON-ON-TRENT GAS DEPARTMENT. Tenders by May 17.
BUXTON GAS DEPARTMENT. Tenders by May 28.
CLITHEROE GAS DEPARTMENT. Tenders by May 22.
DARLINGTON GAS DEPARTMENT. Tenders by May 21.
DEVONPORT GAS DEPARTMENT. Tenders by May 17.
DRONFIELD GAS COMPANY. Tenders by May 31.
EVESHAM GAS DEPARTMENT. Tenders by May 30.
HAWORTH GAS DEPARTMENT. Tenders by May 30.
HEYWOOD GAS DEPARTMENT. Tenders by May 15.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 12.
LEIGH-ON-SEA GAS DEPARTMENT. Tenders by May 16.
MANSFIELD GAS DEPARTMENT. Tenders by May 21.
OMAGH GAS DEPARTMENT. Tenders by May 22.
RICHMOND (SURREY) WATER DEPARTMENT. Tenders by May 28.
SHEPPEY GAS COMPANY. Tenders by May 23.

Exhauster and Steam Engine.
LIMERICK GAS DEPARTMENT. Tenders by May 12.

Fire Clay Goods.
BUXTON GAS DEPARTMENT. Tenders by May 28.

Lime.
BIRKENHEAD GAS DEPARTMENT. Tenders by May 17.
BURTON-ON-TRENT GAS DEPARTMENT. Tenders by May 17.
LEEDS GAS DEPARTMENT. Tenders by May 19.
LEIGH GAS DEPARTMENT. Tenders by May 12.

Oil for Gas Making.
BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by May 16.

Pipes (Iron and Lead), &c.
LEEDS GAS DEPARTMENT. Tenders by May 19.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 12.

Purifiers and Grids.
HAVERFORDWEST GAS DEPARTMENT. Tenders by May 14.

Retort Installation (Inclined).
LEEK GAS DEPARTMENT. Tenders by May 26.

Sulphuric Acid.
LEIGH GAS DEPARTMENT. Tenders by May 12.

Tar and Liquor.
ABERDARE GAS COMPANY. Tenders by June 8.
BIRKENHEAD GAS DEPARTMENT. Tenders by May 17.
BURTON-ON-TRENT GAS DEPARTMENT. Tenders by May 17.
BUXTON GAS DEPARTMENT. Tenders by May 28.
LEIGH GAS DEPARTMENT. Tenders by May 12.
MANSFIELD GAS DEPARTMENT. Tenders by May 21.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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(with which is amalgamated WM. PEARCE & SONS, LTD.
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For all Gas Joints.
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Next Illustrated Advertisement will appear on May 29.
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Best Prices paid.
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SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
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Telegrams: Saturators, Bolton. Telephone 0648.

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THE Water and Gas Debenture Share Investment Trust, Limited, of 37, High Street, Tunbridge Wells, are prepared to Invest £10,000 Capital in above, and also to Underwrite Progressive Water and Gas Companies' issues.

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Twice as Rich as Bog Ore.
Gives no Back Pressure.
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YOUNG Man, 24 Years of Age, requires Position on Gas-Works. Eight Years Experience. Good Reference from well-known Gas Engineer.
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WANTED at the end of May, a Junior CLERK. Previous Experience in Gas Office routine necessary. Commencing Salary, £65.
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WANTED, an Expeditious, Reliable DRAUGHTSMAN, used to Gasholder and Gas Plant details.
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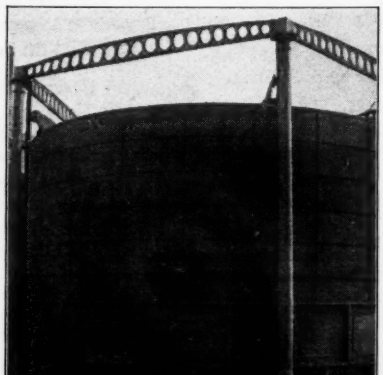
WANTED, by the South Shields Gas Company, an ASSISTANT MANAGER. Applications (with Testimonials or References) stating fully Qualifications and Experience in various Departments, also Age and Salary required, to be forwarded immediately, addressed to the Chairman of the Gas Company, Engineer's Office, Gas-Works, South Shields.

REQUIRED, at a Gas-Works in the Provinces, Two Thoroughly Trained MECHANICAL ENGINEERS—one to SUPERVISE the MACHINERY and PLANT, and the Fitters and Labourers employed in connection with same, the other as YARD FOREMAN. Previous Experience of the kind, in both cases, essential.
Apply, in own handwriting, stating Age, Qualifications, References, Wages required, &c., to No. 4595, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THIS Gasholder for Sale, 30 ft. diameter by 14 ft. deep, about 9500 cubic feet capacity. In good condition. Suit either Brick or Metal Tank.



Existing Cast-Iron Tank is not for Sale, but a cheap Steel Tank will be quoted if required.
Saml. Cutler and Sons, Millwall, London. No. 217.

WANTED, Four Chambers for Ammonia Still, 4 ft. 11 in. diameter over all, 8 in. deep. Second-Hand preferred.
Address No. 4596, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, Copper Scrap, 72s.; Brass, 48s.; Zinc, 16s.; Lead Ashes, 8s. Also old Wet Gas-Meters bought.
Rosse Works, Leeds Road, Bradford.

BARGES for Sale—Owing to the illness of the Proprietor, a Fleet of Steel and Wooden Barges suitable for Gas Companies, Contractors, &c., to be disposed of. All in first-class condition.
Apply, by letter, to No. 4591, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THE London and Provincial Gas-Works Corporation, Parliament Chambers, Westminster, are prepared to PURCHASE outright for Cash a GAS-WORKS where, by the introduction of additional Capital, there would be scope for further extension and development.
Address, with full Particulars, as above.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

LEEDS CORPORATION GAS-WORKS.
THE Gas Committee are prepared to receive TENDERS for the supply of about 11,000 Tons of best Craven or Derbyshire LIME, required for the Purification of Gas at the several Gas-Works during the Twelve Months commencing on the 1st of July, 1906.
Forms of Tender may be had on application to the undersigned.
Sealed Tenders, endorsed "Tender for Lime," addressed to the Town Clerk, Town Hall, Leeds, to be delivered not later than Saturday, the 19th inst.
The Committee do not bind themselves to accept the lowest or any Tender.

R. H. Townsley,
General Manager.

Gas Offices, Leeds,
May 5, 1906.

LEEDS CORPORATION GAS-WORKS.
TENDERS are required as below—
For WROUGHT-IRON TUBES.
For PRESSED and COMMON RED BRICKS.
For 2½-inch, 3-inch, and 4-inch SELF-FACED BRADFORD or HALIFAX FLAGS.
Forms of Tender may be had on application to the undersigned.
Endorsed Tenders, addressed to the Town Clerk, Town Hall, Leeds, to be delivered not later than Saturday, the 19th inst.
The Committee do not bind themselves to accept the lowest or any Tender.

R. H. Townsley,
General Manager.

Gas Offices, East Parade,
Leeds, May 5, 1906.

BOROUGH OF WALSALL.
TENDERS FOR BENZOL AND FOR BENZOLIZED CREOSOTE.
THE Corporation of Walsall invite TENDERS for about 5000 Gallons of 90 per cent. BENZOL for enriching purposes; and also TENDERS for about 3000 Gallons of BENZOLIZED CREOSOTE, free from Naphthalene, to be delivered during One Year, from the 1st of July next, in drums or in casks, to the Corporation Sidings at the Pleck Gas-Works, Walsall.
Further Particulars may be obtained from the Engineer at the Pleck Gas-Works, Walsall.
The Corporation do not bind themselves to accept any Tender, and they reserve the right to divide the Contract between several Firms.
The Corporation will not accept the Tender of any Person or Firm paying less than the Standard Rate of wages to their workmen.
Tenders, sealed and marked outside "Tender for Benzol" or "Tender for Benzolized Creosote," are to be sent to the undersigned not later than Saturday, the 26th of May inst.
When Tendering for the Benzol, the amount of purity should be stated.

John R. Cooper,
Town Clerk.

Council House, Walsall,
May 2, 1906.

MANSFIELD CORPORATION.
(Gas Department.)
TENDERS FOR GAS COAL AND CANNEL.
TENDERS FOR TAR AND AMMONIACAL LIQUOR.
Coal.
THE Gas Committee are prepared to receive TENDERS for 1500 Tons of CANNEL and 11,000 Tons of Best Screened GAS COAL, delivered at Mansfield Station for One Year from the 1st of June, 1906, to the 31st of May, 1907.
Tar and Liquor.
TENDERS for surplus TAR and LIQUOR made from the 1st of June, 1906, to the 31st of May, 1907. Tenders for Liquor to be made either at a fixed price per Ton or on the Sliding-Scale regulated by the price of Sulphate.
Tenders, endorsed "Coals" or "Tar and Liquor," as the case may be, to be sent to J. Harrop White, Esq., Town Clerk, Mansfield, on or before the 21st of May, 1906.
Particulars and all other Information from the undersigned.
NOTE: No Special Form of Tender provided.
The Committee do not bind themselves to accept the lowest or any Tender.

Arthur Graham,
Engineer and Manager.

Gas-Works, Mansfield,
May 4, 1906.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF GAS OIL.

THE Corporation are prepared to receive TENDERS for the supply of about 350 to 450 Tons of OIL, suitable for the Manufacture of Carburetted Water Gas, delivered free at the Gas-Works Siding, in such quantities and at such times as may be required during the period ending the 30th of June, 1907.

Sealed Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Oil," to be delivered at the Town Clerk's Office, not later than Twelve o'clock noon on Wednesday, the 16th day of May, 1906.

The lowest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to receive TENDERS, on Forms to be obtained at the Office of the Gas and Water Manager, for the supply of screened GAS COAL and CANNEL for the Year ending the 30th of June, 1907.

Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office, not later than Twelve o'clock noon on Wednesday, the 16th day of May, 1906.

The lowest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness.

BOROUGH OF LEIGH.

(GAS DEPARTMENT.)

THE Gas and Water Committee of the above Corporation invite TENDERS for the removal of the surplus TAR produced at their Works during the Year ending June 30, 1907. Approximate quantity, 850 Tons.

Forms of Tenders and any further Particulars may be had on application from the undersigned, to whom all Inquiries must be addressed.

Sealed Tenders, endorsed "Tender for Tar," must be delivered to Mr. Stanley Wilson, Town Clerk, Town Hall, Leigh, Lancashire, on or before Twelve o'clock noon on Saturday, the 12th day of May, 1906.

The Corporation do not bind themselves to accept the highest or any Tender.

JAMES GIBSON,
Engineer and Manager.

Gas and Water Offices,
Leigh, Lancashire,
April 24, 1906.

BOROUGH OF LEIGH.

(GAS AND WATER DEPARTMENTS.)

THE Gas and Water Committee of the above Corporation are prepared to receive TENDERS for the supply of the following goods—

1—14,000 Tons of Screened and Unscreened GAS COAL, COBBLES, NUTS, and SLACK.
2—LEAD PIPING (Gas and Water).
3—VITRIOL.
4—LIME.
5—BENZOL.
6—WROUGHT-IRON TUBES and FITTINGS.
7—2-inch, 3-inch, and 4-inch CAST-IRON PIPES and SPECIALS.

Forms of Tender may be had on application from the undersigned, to whom all Inquiries must be addressed; and all Offers must be made on the Official Forms, or they will not be considered.

Sealed and endorsed Tenders must be delivered to Mr. Stanley Wilson, Town Clerk, Town Hall, Leigh, Lancashire, on or before Twelve o'clock noon on Saturday, the 12th day of May next.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide any Tender.

JAMES GIBSON,
Engineer and Manager.

Gas and Water Offices,
Leigh, Lancashire,
April 24, 1906.

BOROUGH OF RICHMOND (SURREY) WATER-WORKS AND PUBLIC BATHS.

TENDERS FOR SMOKELESS WELSH STEAM COAL.

THE Town Council of the Borough of Richmond (Surrey) invite TENDERS for the supply of about 1450 Tons of best WELSH SMOKELESS COAL, to be delivered in barges of about 40 Tons alongside the Wharf opposite the Water-Works, Richmond, for One Year, from the 1st day of July, 1906, to the 30th day of June, 1907.

The seam and district from which the Coal is to be supplied must be stated in the Tender.

Particulars and Forms of Tender can be obtained from Mr. W. G. Peirce, Borough Water-Works Engineer, at the Water-Works.

No Tender will be recognized unless it is made on the prescribed Form, properly filled up in every respect; and no expenses or claim will be allowed or paid to any person, whether tendering or not.

The security stipulated by the Public Health Act, 1875, for the due performance of the Contract will be required, and the Contract and Bond will be prepared by the Town Clerk.

Sealed Tenders, endorsed "Tenders for Welsh Coal," and addressed to the Chairman of the Water Committee, Borough of Richmond (Surrey), must be delivered at the Town Clerk's Office by Ten o'clock on Monday, the 28th of May, 1906.

The Council do not bind themselves to accept the lowest or any Tender.

FREDK. B. SENIOR,
Town Clerk.

Town Clerk's Office,
Town Hall, Richmond (Surrey).

OMAGH URBAN DISTRICT COUNCIL.

THE above Council invite Offers for the supply and delivery of 2000 Tons of Best Screened GAS COAL, free from Pyrites, Dross, and Dirt. The Coal to be delivered as required during the Year ending the 30th of June, 1907.

The Council reserve to themselves the right to divide the Contract as they may think fit, and do not bind themselves to accept the lowest or any Offer.

Tender Forms, with Particulars, may be had on application to the undersigned, and to whom sealed Offers are to be sent, endorsed "Tender for Coal," not later than the 22nd inst.

JAMES BRODIE,
Manager and Secretary.

Gas Office, Omagh,
May 4, 1906.

THE Gas Committee for the City of Limerick are prepared to receive TENDERS for the Supply and Fixing, at their Works at Limerick, TWO ROTARY EXHAUSTERS, with Horizontal STEAM-ENGINES combined, all of the latest and best designs, capable of passing 60,000 cubic feet each per hour.

Full Particulars will be supplied by the Engineer, Mr. H. Hawkins.

Tenders, endorsed "Exhausters," to be delivered to the undersigned not later than Five p.m. on the 12th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
H. HAWKINS,
Engineer and Manager.

Gas-Works, Limerick,
May 1, 1906.

LEEK URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply and erection of Three Beds of INCLINED RETORTS, together with extension to present Coal-Handling Plant and all Ironwork.

Copies of Specification will be sent on application to Mr. A. A. T. Botteley, Gas-Works, Leek, where Drawings may also be inspected.

Tenders, sealed and endorsed "Inclined-Retorts Extension," must be delivered at the Town Hall, Leek, addressed to the Chairman of the Gas Committee, on or before the 26th day of May, 1906.

The acceptance of a Tender is subject to the sanction of the Local Government Board being obtained to the Loan required to carry out the work.

The lowest or any Tender will not necessarily be accepted.

By order,
HAROLD HENSHAW,
Deputy Clerk to the Council.

Town Hall, Leek,
May 4, 1906.

BOROUGH OF BURTON-UPON-TRENT.

THE Gas Committee invite Tenders for:—

GAS COAL.

The supply of 32,000 Tons of best screened GAS COAL and 3000 Tons of CANNEL, to be delivered at the Gas-Works during the Twelve Months ending June 30, 1907, in accordance with the Form of Tender and Conditions which may be obtained from the undersigned.

LIME.

The supply of about 300 Tons best Hand-Picked LIME for Purifying, to be delivered in Sender's or Railway Company's Waggons at the Gas-Works in such quantities and at such times as may be required during the Twelve Months ending June 30, 1907.

TAR.

The purchase of the surplus TAR which will be produced and delivered into the Purchaser's Tank-Waggons at the Gas-Works during the Twelve Months ending June 30, 1907.

Terms of Payment, Net Cash Monthly.

Tenders, endorsed "Coal," "Lime," and "Tar" respectively, are to be delivered to the undersigned on or before Thursday, the 17th day of May, 1906.

The Committee do not bind themselves to accept any Tender.

F. L. RAMSDEN,
Manager and Engineer.

The Gas-Works, Burton-upon-Trent,
May 1, 1906.

BUXTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for:

GAS COAL AND CANNEL.

The supply of 6000 Tons of Best Screened GAS COAL and 3000 Tons of CANNEL, to be delivered as required at the Gas-Works Siding, Midland Railway, Buxton, during the Twelve Months ending July 31, 1907, in accordance with the Specification and Conditions, which may be obtained from the Gas Engineer, Mr. H. Barker, Town Hall, Buxton.

TAR AND AMMONIACAL LIQUOR.

The Purchase of the surplus TAR and the whole of the AMMONIACAL LIQUOR which is produced, and delivered into Purchasers' Tank-Waggons at the above-mentioned Siding, during the Twelve Months ending June 30, 1907.

RETORTS, FIRE-CLAY GOODS, &c.

The supply of RETORTS and the necessary FIRE-CLAY GOODS required during the Twelve Months ending June 30, 1907.

Forms of Tender may be obtained from the Gas Engineer.

Sealed Tenders, endorsed "Coal" and "Cannel," "Tar," "Liquor," and "Fire-Clay Goods" respectively, are to be delivered to the undersigned on or before Monday, the 28th inst.

The Committee do not bind themselves to accept any Tender.

(Signed) JOSIAH TAYLOR,
Clerk.

Town Hall, Buxton,
May 5, 1906.

THE Aberdare Gas Company invite TENDERS for their surplus production of TAR, also for the AMMONIACAL LIQUOR, produced at their Works for the Year ending June 30, 1907. Coal Carbonized, about 7000 Tons.

Sealed Tenders, endorsed "Tar," or "Liquor," as the case may be, addressed to the Chairman, not later than the 8th of June, 1906.

The lowest or any Tender not necessarily accepted.

EVAN JONES,
Secretary and Manager.

BAKEWELL URBAN DISTRICT COUNCIL.

TENDERS are invited for the supply of GAS COAL—1300 to 1500 Tons—and 100 Tons of CANNEL, for One Year, delivered at Bakewell Station (Midland).

Forms of Tender and Particulars can be obtained from the undersigned, to whom Tenders must be sent by the 21st of May.

The lowest or any Tender will not necessarily be accepted.

V. R. COCKERTON,
Clerk.

Bakewell.

TO TAR DISTILLERS AND OTHERS.

THE Corporation of Birkenhead invite OFFERS for the purchase and removal of the surplus TAR produced at their Gas-Works during a period of One Year, commencing on the 1st of July, 1906.

Deliveries will be made at the Gas-Works either into Contractor's Tanks on the Gas-Works Railway Siding or into Tanks for conveyance by road to boats.

The Contractor whose Tender is accepted will be required to enter into a formal Contract or Agreement with the Corporation, upon the specific Terms and Conditions contained in the draft Contract which has been prepared by the Town Clerk, and deposited in his Office for inspection.

Forms of Tender and further Particulars may be obtained from the Gas Engineer, Mr. T. O. Paterson, C.E., Gas-Works, Thomas Street.

Tenders, which must be on the printed Form supplied, sealed and endorsed "Tender for Tar," to be sent in to me not later than Five p.m. on Thursday, the 17th of May, 1906.

The Corporation do not bind themselves to accept the highest or any Tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
May 4, 1906.

TO LIME MERCHANTS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the supply of 850 Tons, or thereabouts, of LIME for Gas Purifying, delivered free into their Gas-Works as required during the Twelve Months ending on the 30th of June, 1907, and as directed by the Gas Engineer, Mr. T. O. Paterson, from whom Forms of Tender and all Particulars may be obtained.

Tenders, sealed and endorsed "Tender for Lime," to be sent in to me not later than Five p.m. on Thursday, the 17th of May, 1906.

The person whose Tender may be accepted will be required to enter into a Contract containing a clause as to the payment of the rate of wages, and the observance of the hours of labour recognized and agreed upon between Trades' Unions and the employers in the locality in which the work for carrying out the Contract is to be performed.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
May 4, 1906.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the supply of COAL, COAL NUTS, and through and through CANNEL for Gas-Making purposes for a period of Twelve Months, commencing from the 1st of July, 1906.

Forms of Tender, together with any further Information, may be obtained from Mr. T. O. Paterson, C.E., Gas Engineer, Gas-Works, Birkenhead.

Tenders (accompanied by copy of recent analysis), stating the price per Ton, delivered on to the Gas-Works Railway Siding, must be sent in to me, sealed and endorsed "Tender for Gas-Works Coal," not later than Five o'clock in the Afternoon of Thursday, the 17th of May, 1906.

Also for the supply of SCREENED COAL, WASHED SLACK, or SMALL COAL to be delivered at the Pumping-Stations of the Spring Hill, Flaybrick Hill, Borough Road, Mount Road, the Ford Water-Works, and the Hind Street Water Stores, for a period of Twelve Months, commencing from the 1st of July, 1906.

Forms of Tender, together with any further Information, may be obtained from Mr. J. W. M. Richardson, C.E., Assistant Water Engineer, 52, Balls Road, Birkenhead.

Tenders, stating the Price per Ton delivered at the various Pumping-Stations, must be sent in to me, sealed and endorsed "Tender for Water-Works Coal," not later than Five o'clock in the Afternoon of Thursday, the 17th of May, 1906.

All deliveries to be made from time to time according to the requirements of the respective Engineers.

The parties whose Tenders may be accepted will be required to enter into a Contract containing a clause as to the payment of the rate of wages, and the observance of the hours of labour recognized and agreed upon between the Trades' Unions and the Employers in the locality in which the work for carrying out the Contract is to be performed.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
May 4, 1906.

DRONFIELD GASLIGHT AND COKE COMPANY, NEAR SHEFFIELD.

THE above Company invite Tenders for 1000 (One Thousand) Tons of best Screened GAS COAL, to spread over the Twelve Months ending June 30, 1907. The Coal to be delivered in such quantities and at such times as the Manager may direct.

Tenders to be sealed, and endorsed "Tender for Gas Coal," and to be sent to the undersigned by Thursday, the 31st inst.

HAROLD WHITE,
Secretary.

May 5, 1906.

THE Haworth Urban District Council are prepared to receive TENDERS for the supply of 2500 Tons of GAS COAL (Screened, Unscreened, and Gas Nuts) delivered at the Haworth Station during the ensuing Twelve Months.

Sealed Tenders, endorsed "Gas Coal Tender," to be forwarded to me the undersigned not later than the 30th inst.

No Special Form of Tender.

WILLIAM ROBERTSHAW,
Clerk to the Council.

1, Burlington Chambers,
North Street, Keighley.

LEIGH-ON-SEA URBAN DISTRICT COUNCIL.

THE Leigh-on-Sea Urban District Council invite TENDERS for the supply of 1200 Tons of good GAS COAL, to be delivered at the Gas-Works Wharf, Leigh-on-Sea, as required, in quantities of not less than 80 Tons.

Sealed Tenders, endorsed "Tender for Coal," must be received by me not later than Wednesday, the 16th day of May inst.

The Council do not bind themselves to accept the owest or any Tender.

W. CARLYLE CROASDELL,
Clerk to the Council.

Council Offices, Leigh-on-Sea,
May 1, 1906.

BOROUGH OF EVESHAM.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Evesham Corporation invite TENDERS for the supply of from 1000 to 2000 Tons (or less if required) of best Screened GAS COAL, during the Year ending the 30th day of June, 1907, to be delivered on rail at Evesham.

Tenders, to be marked "Tender for Gas Coal," to be sent to me not later than the 31st day of May inst., and to include full description as to Coal and Price.

No Form of Tender supplied.

The Corporation do not bind themselves to accept the lowest or any Tender.

THOS. A. COX,
Town Clerk.

Town Clerk's Offices,
Evesham, May 2, 1906.

TO BOILER MAKERS.

THE Gas Committee of the Coventry Corporation invite TENDERS for the Manufacture and delivery, at their Foleshill Works, of Four LANCASHIRE BOILERS, each 30 ft. long by 7 ft. 6 ins. diameter.

Specification, with Form of Tender, can be obtained on application to the undersigned on payment of Ten Shillings, which will be returned on receipt of a *bonâ-fide* Tender.

The Committee do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, addressed to the Chairman of the Gas Committee, Gas-Works, Coventry, endorsed "Tender for Boilers," must be delivered on or before Nine a.m. Monday, the 14th inst.

FLETCHER W. STEVENSON,
Engineer and General Manager.

Gas-Works, Coventry,
May 3, 1906.

SHEPPEY GAS COMPANY.

TENDERS are invited for the supply of about 10,000 Tons of Ravensworth Pelaw GAS COAL, unscreened, or any similar class of Gas Coal, for the Year commencing July 1 next.

Deliveries to be free alongside the Company's Wharf, at West Minster in the Medway.

Quantities as certified by the Company's Meter over their Weighing Machine.

Cash Monthly.

Tenders to be accompanied by a working Analysis of the Coal offered, and received not later than the 23rd of May.

The Directors do not bind themselves to accept the lowest or any Tender.

No Special Form of Tender required or supplied.

H. BARBER,
Secretary and Manager.

Gas Offices,
2, Trinity Road, Sheerness.

CORPORATION OF DARLINGTON.

(GAS-WORKS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas-Works Committee of the above Corporation invite TENDERS for the supply of 35,000 Tons of Freshly-Wrought GAS COALS, delivered at the Gas-Works Siding as required during the ensuing Twelve Months.

Further Particulars and Form of Tender may be obtained from Mr. Frank P. Tarratt, Gas-Works Engineer, Darlington.

Tenders, endorsed "Tender for Gas Coal," to be delivered at my Office, Houndgate, Darlington, not later than May 21, 1906.

No pledge is given that the lowest or any Tender will be accepted.

(Signed) H. G. STEAVENSON,
Town Clerk.

Town Clerk's Office,
Darlington, May 5, 1906.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of 12,000 Tons of COAL and 3000 Gallons of BENZOL.

Specification and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.

Sealed Tenders, endorsed "Coal," or "Benzol," to be sent to me not later than Tuesday, May 15, 1906.

By order,
GEO. G. BOUCHIER,
Town Clerk.

Municipal Buildings,
Heywood, April 26, 1906.

THE Haverfordwest Town Council in- vite TENDERS for the Supply, Delivery, and Erection, on Foundations provided by the Town Council, of Two GAS PURIFIERS, 11 feet square by 4 feet deep, inside measurement, with Two Sets of WOOD GRIDS for each, with the necessary Bearing Bars, Fasteners, Air Plugs, and Wrought-Iron Cover, ¼ inch thick.

The Contractor will not be required to do any Pipe or Valve Connections.

Tenders, endorsed "Purifiers," to be sent to the Town Clerk, Haverfordwest, by Monday, May 14, 1906.

Further Particulars may be obtained from

J. GIBBON,
Gas Manager.

Haverfordwest, April 26, 1906.

BOROUGH OF CLITHEROE.

(GAS DEPARTMENT.)

TENDER FOR GAS COAL.

THE Gas Committee invite Tenders for Screened GAS COAL, NUTS, SLACK, and CANNEL, to be delivered at the Gas-Works Siding, during the Year ending June 30, 1907.

Particulars and Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Gas Coal," addressed to the Chairman of the Gas Committee, to be delivered at my office on or before Tuesday, the 22nd of May, 1906.

ROBT. BARRETT,
Manager.

Gas-Works, Clitheroe,
May 2, 1906.

COUNTY BOROUGH OF DEVONPORT.

(GAS DEPARTMENT.)

THE Gas Committee of the Devonport Corporation are prepared to receive TENDERS for the supply of 30,000 to 40,000 Tons of GAS COAL, to be delivered in such quantities as may from time to time be determined previous to the 30th of June, 1907.

The Coal is to be delivered c.i.f. at Tamar Wharf.

Forms of Tender and Specification may be obtained from the undersigned.

The Committee reserve the right to accept Tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Coal," and addressed to R. J. Fittall, Esq., Town Clerk, Devonport, are to be delivered at the Town Clerk's Office, on or before Thursday, the 17th of May, 1906.

By order,
JOSEPH WM. BUCKLEY, Assoc.M.Inst.C.E.,
Engineer and General Manager.

Gas-Works, Devonport,
May 4, 1906.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that an Ex- TRAORDINARY GENERAL MEETING of the Bromley Gas Consumers' Company will be held, at Six p.m. precisely, on Tuesday, the 22nd day of May, 1906, at the "Bell" Hotel, Bromley, for the purpose of rescinding the Resolution, passed at the General Meeting of the Company, held on the 20th day of February last, creating £10,000 of "B" Ordinary Stock of the Company, and of cancelling such Stock; and to resolve upon the creation of £10,000 of "A" Ordinary Stock of the Company, and to authorize the Directors to issue the same at such times, upon such terms, and in such manner, as they may think fit, subject to the Statutory Conditions of Sale and issue relating to such Stock.

By order of the Directors,
HENRY WILLIAM AMOS,
Secretary.

156, High Street, Bromley,
Kent, May 1, 1906.

CHIPPENHAM GAS COMPANY.

ISSUE OF £8000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK,

In pursuance of the powers of the Chippenham Gas Act, 1904.

MINIMUM PRICE, £100 PER CENT.

THE Directors of the Chippenham Gas Company give Notice that they will be prepared to receive, not later than Eleven o'clock a.m. on Friday, the 18th day of May, 1906, sealed TENDERS, addressed to the Directors of the Company, care of Messrs. Keary, Stokes, and White, Solicitors, Chippenham, for £8000 PERPETUAL DEBENTURE STOCK, to bear Interest at the rate of £4 per Centum per Annum, to be paid up in full on or before the 30th day of June, 1906.

The Interest on this Debenture Stock will have priority of payment over all Dividends on the Ordinary and Preference Stock.

Any amount, not being less than £20 or a multiple of £10 thereof, may be tendered for; and the Stock will be registered in the Company's Books in the names of the Purchasers or their nominees free of expense for Stamp Duty and Registration Fee.

Further Particulars, Conditions, and Form of Tender may be obtained of

MR. H. W. SAVILLE,
Secretary to the Company,
or of Chippenham;
Messrs. KEARY, STOKES, AND WHITE,
Chippenham,
Solicitors to the Company.

Dated the 21st of April, 1906.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the Half- YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 1st inst.—

JOHN HORSLEY PALMER, Esq., in the Chair,

when the following RESOLUTIONS were unanimously PASSED:—

"That the Report of the Directors upon the affairs of the Association be received, adopted, and entered upon the Minutes."

"That a Dividend of 5 per cent. for the Half Year ended the 31st of December last be declared upon the £3,800,000 Capital Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 8th inst."

"That John Horsley Palmer, Esq., be re-elected a Director of the Association."

"That Robert Tindall, Esq., be re-elected a Director of the Association."

"That Sir Charles James Jessel, Bart., be re-elected a Director of the Association."

"That Montagu Somes Pilcher, Esq., be re-elected an Auditor of the Association."

Votes of Thanks were passed to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the Chair, and to the Staff in London and on the Continent.

An EXTRAORDINARY MEETING of the Proprietors was then held—

JOHN HORSLEY PALMER, Esq., in the Chair,

when the following RESOLUTIONS were unanimously PASSED:—

1. "That in pursuance of the Statutory Power of the Association in this behalf, the nominal Capital of the Association be increased from £3,800,000 to £4,940,000 by appropriating for this purpose £1,140,000 from the sum or sums applied from time to time out of Revenue to the extension and improvement of the Works of the Association, and to other purposes to which Capital was properly applicable."
2. "That the increased Capital of £1,140,000 be issued in the form of Capital Stock, ranking *pari passu* with that already issued and be allotted to the present Proprietors free of cost, in proportion to their holdings, at the rate of £3 for every £10 now registered in their names, and that this increase do take effect on the re-opening of the Register of Transfers of Capital Stock on the 2nd inst."
3. "That the Capital Stock be transferable on and after the said 2nd inst. in multiples of One Pound instead of multiples of Ten Pounds as at present."

By order of the Board,
ROBERT W. WILSON,
Secretary.

Offices: 21, Austin Friars,
London, E.C., May 2, 1906.

FREEHOLD TAR DISTILLING WORKS, ASHTON NEW ROAD, CLAYTON, in the CITY OF MANCHESTER.

FOR SALE, IN ONE LOT, WITH OR WITHOUT PLANT AND MACHINERY.

TO be Sold by Auction, by Edward RUSHTON, SON, & KENYON, at the Thatched House Hotel, on Tuesday, the 22nd day of May, 1906, at 3 for 3.30 o'clock, subject to the General Conditions of Sale of the Manchester Incorporated Law Association, and to the Special Conditions to be then produced, and which may be inspected at the Offices of the undermentioned Solicitors one week prior to Sale.

The TAR DISTILLING WORKS AND PREMISES, situate in Ashton New Road, Clayton, and known as the "Dalton Chemical Works," with the LAND forming the Site thereof, DWELLING HOUSE, and the Fixed and Loose PLANT and MACHINERY therein, except the Mines and Minerals under the said land.

The Land forming the Site of the Works is Freehold and Free from Chief Rent, and contains an area of 8467 Square Yards or thereabouts, with a frontage to Ashton New Road of about 400 Feet, and bounded in the rear by the Manchester, Stockport, and Ashton-under-Lyne Canal, and also by an arm of the said Canal, from which water is obtained for condensing purposes free of charge.

The Buildings erected on the land include Laboratory, General and Private Offices, Smithy and Workshop, Stables and Stores, Two-Storey Workmen's Cabin, Range of Lofty Sheds, Pitchpits, Chimney (50 yards high), Canal Wharves, Boundary Walls, and a Dwelling House, numbered 497, Ashton New Road.

The Plant and Machinery include: Two Lancashire Steam Boilers, 30 ft. by 6 ft. 9 in. (one dismantled); 10 Cameron's Pumps; Five Steel and Wrought-Iron Stills, three of 3800 and two of 2400 Gallons capacity, with Furnaces, Condensers, and Receivers; Wrought Iron Naphtha Still; Tar Receiving Tank, 30 ft. long by 10 ft. 2 in. by 5 ft. deep; 17 Boiler Tanks, varying up to 34 ft. long and 7 ft. 3 in. diameter; Two Circular Light Oil Tanks, each about 1000 Gallons capacity; Egg-Ended Tank, 35 ft. 6 in. long by 7 ft. diameter; One ditto, 12 ft. long by 4 ft. 9 in. diameter; Water Store Tank, about 3800 Gallons capacity; Seven Boat-shaped Anthracene Pans, from 11 ft. 6 in. to 30 ft. 6 in. long and 4 ft. 6 in. to 6 ft. 6 in. diameter; Filter Tank, 30 ft. long by 4 ft. 2 in. wide by 1 ft. 6 in. deep; Six smaller ditto; Carbolic Acid Tank, 14 ft. long by 6 ft. 3 in. diameter, with Agitator, Shafting, &c.; 24 various Mixing, Melting, and other Tanks; Seven Oil and Naphtha Receivers; Lead-Lined Wood Tanks; Hydraulic Press; Filter Pipes; Carters' No. 1 Disintegrator; Steam, Liquor, Water, and other Piping; 2-Ton Wharf Crane; 10-Ton Lurry Weighbridge; Portable Tar Barrel; Laboratory Fixtures and Appliances; Smithy and other Tools; Office Furniture, Milners' Safe, and General Loose Articles and Effects in and upon the premises (excluding a Chatwood's Safe and three pieces of a Beetling Machine).

N.B.—In the event of the Works not being sold as above, the property will then be OFFERED IN ONE LOT, WITHOUT THE PLANT AND MACHINERY.

Further Information and Cards to View may be obtained from the AUCTIONEERS, 13, Norfolk Street, or from Messrs. CHAPMAN, ROBERTS, AND BECK, Solicitors, 32, Fountain Street, both of MANCHESTER.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the Shareholders, at their Ordinary General Meeting held this day, have DECLARED A DIVIDEND of 7 per cent. for the Year ended December 31, 1905, of which 3 per cent. was distributed in October, 1905, by way of Interim dividend; leaving the balance of 4 per cent. (8s. per share) to be paid forthwith, free of Income-Tax.

And Notice is Hereby Further Given, to the holders of Share Warrants to bearer of this Company, that Coupon No. 32 is payable by the Company's Bankers, the Union of London and Smith's Bank, Limited, 50, Cornhill, E.C., at the rate of 8s. per Coupon. Coupons must be left with the Bankers three clear days for Examination.

By order,
J. M. MACMORRAN,
Secretary.

1, East India Avenue,
Leadenhall Street, E.C.,
May 3, 1906.

SHANKLIN GAS COMPANY, LIMITED.

ISSUE OF £3700 ADDITIONAL CAPITAL.

NOTICE is Hereby Given, that in pursuance of the Powers contained in the Shanklin Gas Order, 1878, and in accordance with the special resolution of the Company passed on the 5th day of February, 1902, and confirmed on the 25th day of February, 1902, the Directors now offer for Sale by TENDER 740 FIVE-POUND SHARES, ranking for Standard Dividend of Seven Pounds per cent. per annum, subject to the sliding-scale.

The Shares form the balance of the Capital known as "New Ordinary Shares," upon which the full Dividend of £7 per cent. has been paid for many Years past.

The Purchase Money will be payable on or before the 30th of June, 1906, and Dividends on the same will commence on the 1st of July, 1906.

Forms of Particulars and Conditions of Sale, together with an approved Form of Tender, may be obtained from the Company's Bankers, Shanklin, I. of W., or the Offices of the Company, Landguard Road, Shanklin, I. of W.

No Tender will be received after One o'clock p.m. on Monday, May 14, 1906.

By order of the Board of Directors,
FRANK C. TAYLOR,
Engineer and Secretary.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SUTTON GAS COMPANY.

NEW ISSUE OF £7000 CONSOLIDATED ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 22, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £10,000 THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 29, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 1200 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 29, at Two o'clock, in Lots.

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Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

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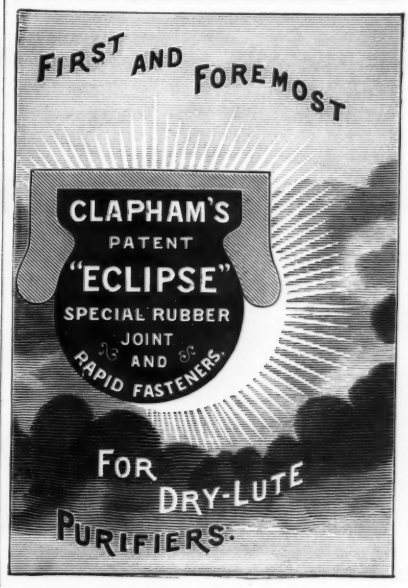

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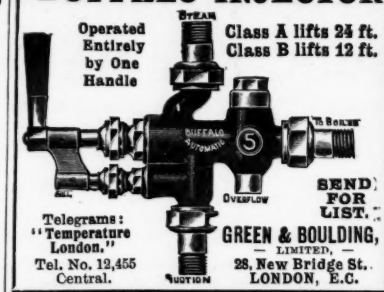

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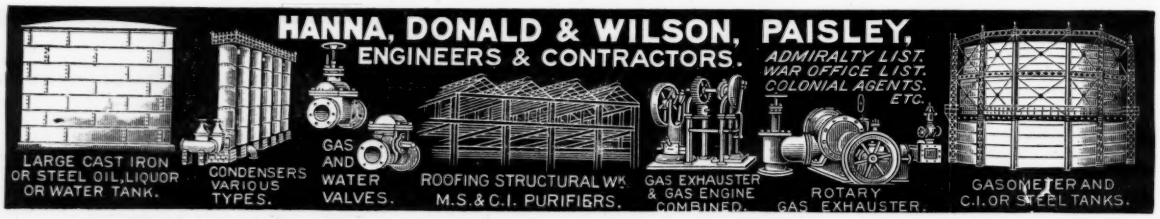
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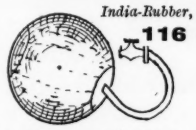

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is a stove specially designed to meet the requirements of Gas Undertakings where a large Double-Cased Cooker is wanted **at a low price.**

DISTINCTIVE IN DESIGN.

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The "GARNET" is a Double-Cased and Packed Stove made in two sizes:

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Oven (inside), 27½ in. high, 14 in. wide, 14 in. deep.
Hot-Plate, 23½ in. by 21 in.
Height over all, 35½ in.

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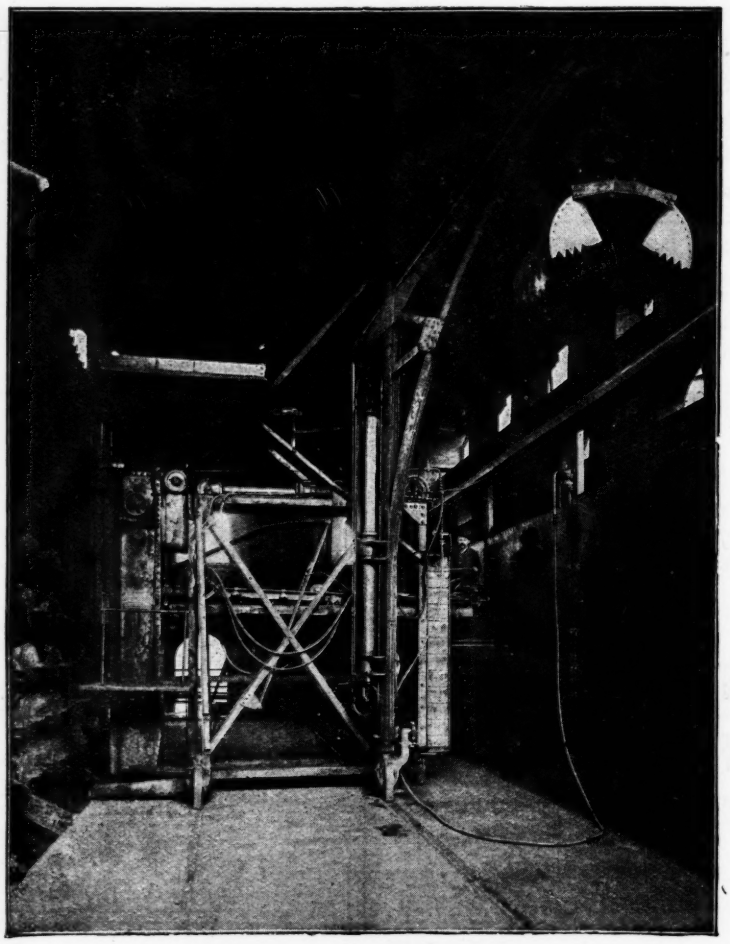

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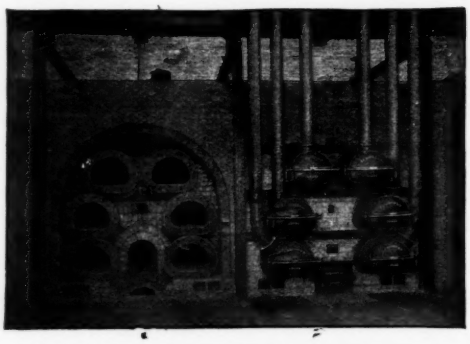

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Minimum Fuel Consumption.

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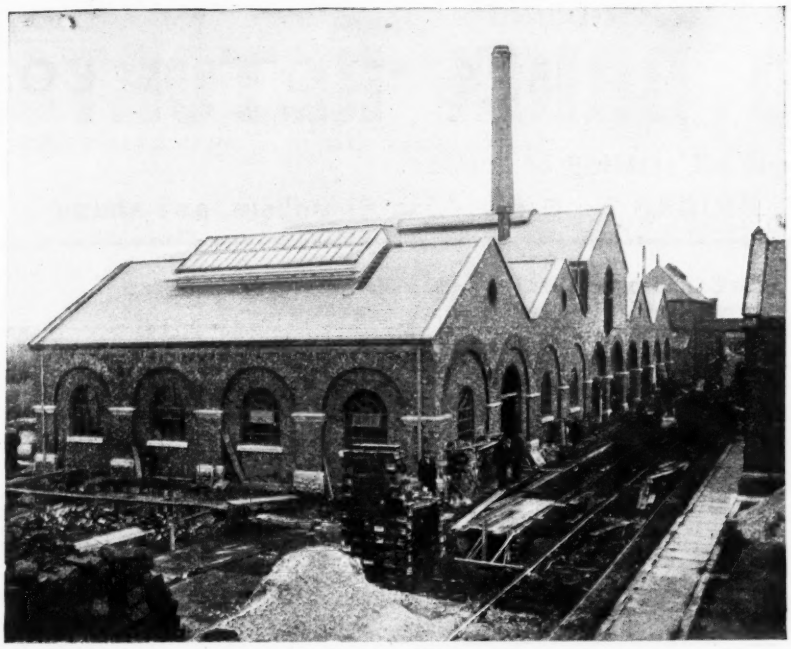

Photo. showing Methane-Hydrogen Plant under construction at the Great Western Railway Gas-Works, Swindon.

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The Methane-Hydrogen Apparatus uses **TAR** instead.

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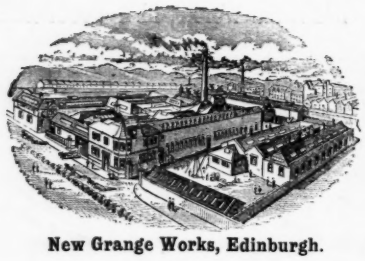

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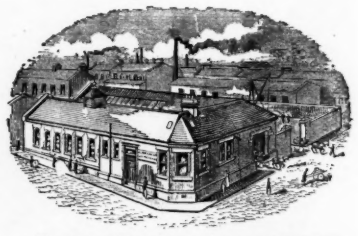

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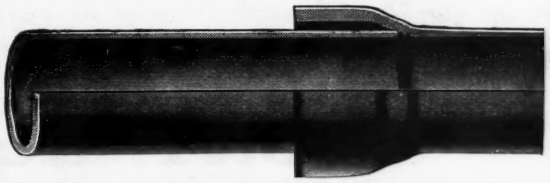

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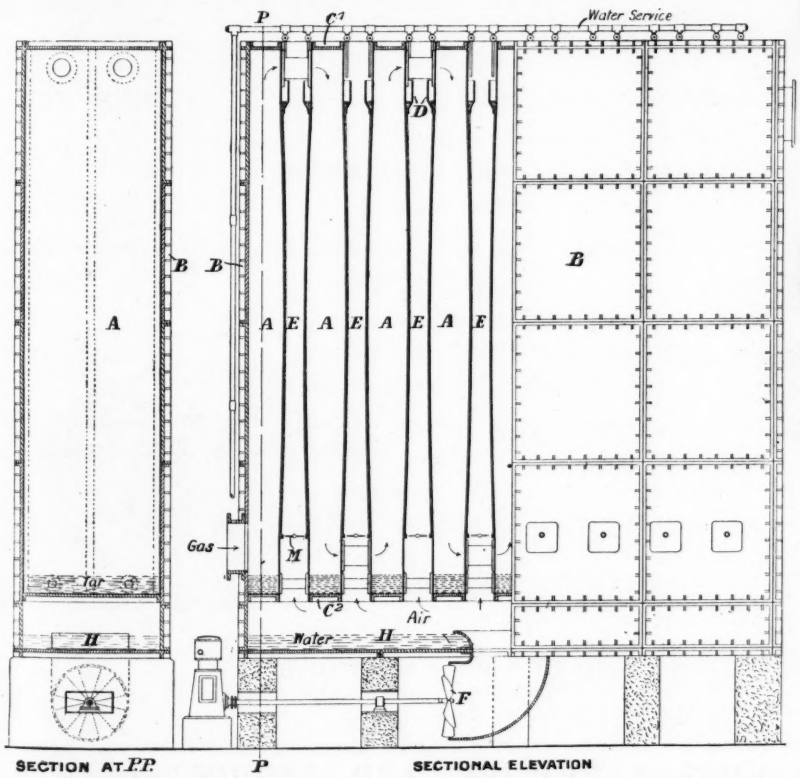

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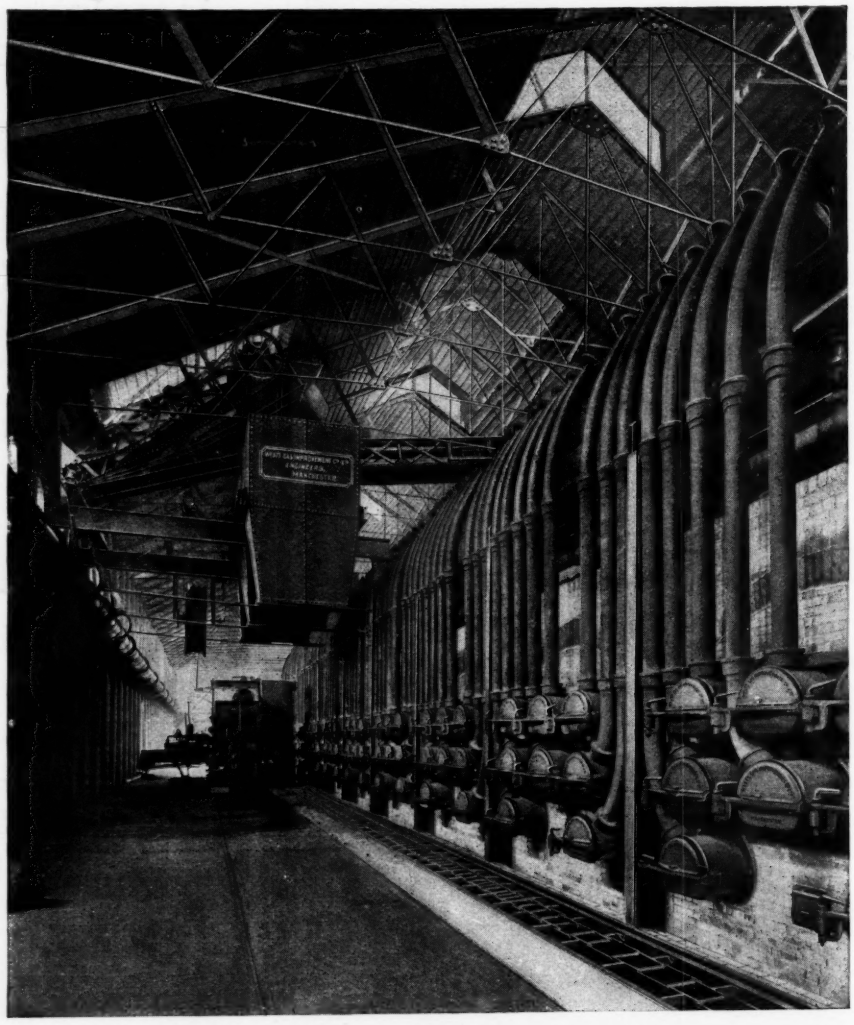

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